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ISSUED SEMI-MONTHLY

ADVERTISING RATES FURNISHED ON APPLICATION.

THE RECENT BOND SALE.

For the first time the government of the United States has made the experiment of offering a loan to the people of the country. It was an offering of $200,000,000, and was bid for more than six times the amount. The offerings in sums of $500 and under absorbed the entire series. The bonds were issued in the sum of $20, and in multiples thereof. The people put their savings into Uncle Sam's securities, rather than to hoard them or place them in savings institutions. The success of the scheme makes it improbable that the government will ever hereafter rely on rich syndicates to take its securities.

The issues being in small denominations—make it convenient to use the coupon bonds in ordinary business transactions, and operates as an increase of the circulating medium, and, consequently, as a stimulant to enterprise and commerce. The success that has attended the experiment suggests the wisdom of trying to refund all outstanding bonds as fast as possible into bonds of a less rate of interest and of small denominations, and the people may have the opportunity to absorb the whole indebtedness of the government. There is little doubt that the securities would be taken as fast as it is possible for the government to make the change.

The securities of Great Britain and France are not to any extent in the hands of foreigners but are held by their own people. The consequence is that the wealth of these nations is not depleted by the payment of interest to foreigners, while the people are taxed to meet interest charges, the money is distributed to their own citizens. It has been different in this country, as we have been paying interest abroad and reducing our own wealth or deducting from that which is annually produced. Another important feature is that a government which only owes its own people is stronger than one which is indebted to foreigners, for, to their patriotism is added pecuniary interest.

The embarrassments to both government and people in this country have proceeded from the fact that we have relied on foreign capital, not only to meet the demands upon government, but to develop our productive enterprises, the profits from which have largely accrued to the benefit of the foreign lenders and investors. These practices have continued as long as this country can stand it. The time has come when we should rely on our own capital, and it would be better to postpone enterprises for a time, and, until they can be undertaken with our own means, rather than to depend on aid from European money lenders, or those who seek investments in this country. When foreign money is being received and expended the situation is pleasing, but it is quite different when payday comes, and that day arrives every six months or a year, so far as concerns the payment of interest or dividends.

If a nation would be independent, it should avoid indebtedness to other peoples. There seems to be no need that we should contract foreign indebtedness hereafter in ordinary or perhaps under any circumstances. Our natural resources are so abundant, and the intelligence and energy of our people are so great that we can in future provide ourselves with all the necessary capital. Every year in which we keep our produced wealth to ourselves will give us enlarged financial strength, and enable us to do our own work with our own resources.

It has been said that "a public debt is a public blessing," which has been disputed as an abstract proposition, but, as we have a public debt, and one which will linger with us for an indefinite time, it presents an opening for the safe investment of the funds of minors, old people, and many other kinds which of necessity are held in trust. The surplus earnings in youthful and active days are so much stored labor, and Uncle Sam's treasury is a safe storehouse for it.

The successful experiment that has been made is likely to prove of incalculable value in many ways. We are about to enter upon a new century and a new era, a career of American independence, financial and commercial, as well as national and political.

THE INTERNATIONAL MINING CONVENTION.

According to the intentions of the objects of the association, as outlined in former issues of this JOURNAL, if carried out, may be made to work much good to the mining interests of the Western States If, however, the chief object is to change our present federal mining laws, in respect to the most just provision contained therin—in allowing the prospector or miner to follow the dip of his vein or deposit parallel to the side lines of his claim to an unknown depth, then the proposed change will be a retrograde step, by changing to the square location of large area, and bounded by vertical side lines produced downwards from the said side lines of the square location.

The large extent of mineral development attained in the Western States and Territories has been gained through the wise provision of allowing the fullest scope to the efforts of the miner to develop his ore body in depth, under the law of the apex and extra lateral rights, and to depart from this just custom is to adopt a system which stops deep mining, and which is as fruitful of litigation and lawsuits as that now in force. As pointed out in this JOURNAL on former occasions, the error or evil does not lie in the boundaries of our mining claims, but in our wrong manner of settling mining diputes in courts of law by lawyers, whose chief business is to carry on the litigation for all there is in it for their own interests.

Our mining laws ought to be administered in each State and Territory by a Commissioner of Mines, and by each of the disputants naming an arbitrator who is a mining engineer to act for them, and, if necessary, with power for them to name a third arbitrator. In this manner it is to the interests of these parties to obtain a settlement of the dispute, by taking the evidence on the ground and not in courts of law, and to act in the cause of justice to labor and capital invested in mining. As there is as much cause for dispute under the square location or that with vertical side line boundaries as under our present law, it is clear that it is our system of dealing out justice in courts of law that is at fault, and not the just miners' boundary, with side lines conforming to the dip of his deposit. To create a boundary which stops deep mining, and to say to the industrious miner who has developed ore in depth "thus far and no farther shalt thou go," is to stop industry and cause the worst form of monopoly to exist, and to give to another the reward earned by the investment of labor and capital in deep mining, and that is what the proposed change in side-line boundaries will do. Therefore, let side-line boundaries alone and change our wrong system of administering justice in courts of law to arbitration on the ground by mining men conversant with mining conditions.

THE SQUARE LOCATION.

The square location of large area is the system of surveying land in the eastern States, and is not a suitable or just system for the boundaries of a mining claim. Another important objection to it is that within its area are sure to be included more than one class of deposit or vein of ore. This rule holds true for the East as well as the Western States. Our present mining claim in the form of a parallelogram, of six hundred by fifteen hundred feet, containing 20.66 acres, is wide enough under our present law, and to increase the width is to include in it other minerals, or veins, or deposits, than that for which the location is made. The square location is found to be too large on that account in the Province of British Columbia, where it is now in force, and, for the last cause named, they desire to adopt a system somewhat similar to that of the United States. The fact is worthy of note, on account of a small minority in the United States who have had no experience as to its unjust operation to the miner to change to that form of location. As long as there are two veins or deposits running parallel to each other, of the same mineral or ore for which the location is made, it is not an exclusive grant of territory; but when another class of ore is found running parallel to it for which the miner has no use, then the large location prevents prospecting, and causes a monopoly of the undeveloped minerals. It is therefore not a mining condition in the interests of the largest amount of mineral development, and one which cannot be recommended on any cause but that of ignorance and monopoly.

A MINE PLAN ON GLASS.

The recording of mining work in most mines is a matter to which little heed is paid in the large majority of cases. This step is necessary both on account of the interest of the employed and the owner and manager. The intelligent understanding of the location and extent of the mine development by the workmen is highly important. To attain this object, a mine plan of the underground workings is instructive and useful, in addition to the office plan on paper. For this purpose such a plan should be placed at the

shaft house or hoisting works most convenient to the shaft or tunnel. A working plan of the shaft and each level of the mine can be made by taking two sheets of plate glass, which are supposed to represent the vein, and ought to be placed at the angle of the dip of the lode, and by painting on the glass with oil paint and the use of small pieces of wood, to represent timbers placed in the mine. A correct model of the shaft and level represented can be made, which can be colored to indicate the ground stoped, timbered, filled with refuse, as well as the ground unworked, with ore shoots or chimneys indicated, and so also with each succeeding level of the mine. By usidg sheets of plate glass of sufficient size, any desired scale can be made, and by the placing of the two sheets at the required distance apart from each other, a good model of the workings can be made.

Such a plan is of great service to the manager or foreman in giving instructions to the miners or timbermen, and in giving the employees a clear understanding of the location of the ore bodies and correct position of the workings.

KLONDIKE FAILURES.

As predicted in these columns in former issues, the return to the United States of many who went to the North Western gold fields some months ago, with ruined constitutions, and without the fortune, or often without their outfit and penniless, are evidences of the truth and sincerity of our warning remarks which were not heeded. If this suffering came on those alone who went there it would not be so severe, but when it falls to the lot of widows and orphans, the Klondike craze will have cost as much money and lost as many lives, in proportion to those engaged, as has the present war with Spain, and the gain will be as great to the general interests of the country.

THE WAR TAX ON STOCKS.

If this tax has the effect of weeding out all stock gambling operations in bogus mining ventures, which have their existence mostly on paper, and on which the location of the supposed mine itself has been known to change from one prospect claim to another a few mies off, as in the case of one notorious fake mining enterprise of recent date, it will have accomplished one good and in aiding those who staid at home, as well as adding power to the sinews of war. The mining industry can well afford to pay its share to the cause of liberty and justice to the oppressed colonial subjects of Spain, especially if that will increase the mineral area and foreign trade of the United States, of which the miners will get their share, and it may also help in giving additional territory to prospect, develop and supply with machinery, in place of our people going to seek misery and misfortune in the inhospitable northern wilderness.

SOME REMARKS ON THE CYANIDE PROCESS.

(Continued from July 15th issue.)

There is no more doubt that an ore crushed to as even a size as possible is much better leachable than an ore crushed into various sizes. Even a very finely powdered silicious ore can be leached successfully, if the size of the very small particles is more of an even size. Ores crushed to different sizes do not leach so well, because the minimum particles will always fill out the minimum spaces left between the coarser particles, and render it, therefore, much more difficult for the solution to penetrate and come in contact with the gold-bearing particles of the ore.

On the Crown Reef mine, one of the best managed mines on the Rand, for instance, the ore is separated into two sizes and slimes, by means of Spitzkasten, after leaving the plates. Each size is collected in a different leaching vat and treated by itself. The extractions are very good, as shown by the following figures:

In February, 1895, 16,056 tons of ore were treated. 59 721 per cent pure gold of the assay value of the ore were recovered over the plates. The first size, being the coarser and more pyritic ore, amounted to 1057 tons. The residue of this size assayed 1.5 dwts per ton, after treatment by cyanide, and the amount of this gold recovered, 7.578 per cent of the assay value of the ore.

The second size, being the finer and more sandy ore, amounted to 10,152 tons, (residues assaying 0.87 dwt per ton, after treatment with cyanide,) fine gold recovered 17.829 per cent of the assay value of the ore. Slimes amounted to 4,847 tons, assaying 3.07 dwts per ton.

This gives a total actual extraction of 85.-128 per cent on the assay value of the ore, and a loss of 14.878 per cent, of which however 8.687 per cent were contained in the slimes, of which again about 85 per cent were recovered by a process worked out and introduced by Mr. Williams; so that there was an actual loss of only about 7 per cent of the fine gold contained in the ore, or about 1.5 dwt per ton of ore.

Before referring now to the above-mentioned so called double treatment, I should like to quote a remark made by Mr. McArthur, at a meeting of the Society of Chemical Industry in 1890:

"Elsner has stated metallic gold dissolves in cyanide of potassium only in presence of oxygen. Not having seen the original account of Elsner's researches, I am not in the position to criticise his experiments, but I never could find that the presence of oxygen was necessary either to dissolve gold by itself or from ores by cyanide. If a piece of gold be immersed in a cyanide solution, so that air to act on it would have to penetrate two inches or three inches of the solution, the gold will dissolve in its usual slow and steady fashion. The equation shows that either oxygen must be absorbed or hydrogen evolved. I have seen no evidence of the former, and can adduce no proof for the latter; but I think the latter the more probable, because I cannot conceive oxygen penetrating even a film of cyanide solution without at once oxidizing the cyanide to cyanate, whereas in the other case, as suggested to me by my friend Mr. Ellis, the nascent hydrogen may be at once seized by the excess of cyanide present and ammoniacal compounds formed. However, we do not concern ourselves much with the reactions of pure gold, but as a matter of fact we cannot find that oxygen plays any part in the cyanide extraction of gold from ores. We have treated an ore with cyanide with free access of air, and then a parallel experiment was done with boiled water, the bottle filled to the stopper with solution and ore, and the stopper sealed. The extraction was the same in both cases."

Today no chemist is in doubt any more that Elsner's fomula is correct, and that the presence of oxygen is absolutely necessary for dissolving gold by cyanide. That this is so was proven by many experiments, of which I will mention one as a very striking one:

Take two small pieces of filter paper, put equal parts of precipitated fine gold in powder form on each of them. Make up a very dilute solution of cyanide into two beakers Take one of the filter papers with the gold on it and put it in one of the beakers, but so that it floats on the surface of the solution only. Take the other filter paper with the gold on it and bring it into the second beaker, but so that it is covered by the solution at once. Allow it to settle to the bottom of the beaker, and if it does not do this by its own gravity, assist with a glass rod.

You will notice that the gold on the first filter paper will be dissolved in a few seconds, on account of the cyanide solution coming in contact only from below, while the gold itself is exposed to the oxygen of the air. The gold on the second filter paper, which lies at the bottom of the beaker, and which is perfectly covered by the solution, therefore not being able to come in direct contact with the oxygen of the air, requires hours before it becomes dissolved.

The practical confirmation of Elsner's theory has led to the so-called double treatment, which in fact is nothing but an oxidation process, in which oxygen of the air takes the part of an oxidizing agent.

To apply the double treatment, two leaching vats are placed above one another, so that the contents of the upper one can be easily discharged into the lower one, by means of Butter's patented bottom discharge. After the ore is charged into the upper vat, it is moistened with a dilute cyanide solution. After several hours the ore is discharged into the lower vat. By doing so, the ore moistened with the cyanide solution cannot help coming in contact with the oxygen of the air.

The practical result is that the first leaching, followed with a very weak cyanide solution in the second vat, gives the second solution by far the largest percentage of the gold contained in the ore solution. Practically, the formation of the double salt, gold cyanide potassium, had already taken place, and it requires only several washes with a very weak solution to extract the yellow metal.

Free milling sandy tailings do not require a double treatment. The oxygen of the air brought into contact with the ore at the same time with the solutions is sufficient in these cases.

The double treatment has been worked with very good results on pyritic tailings, and I do not see why it should not work well with a low grade pyritic ore as well.

In cases in which the gold contained in the ore is not very readily acted upon by cyanide, a so called artificial oxidation may be applied with success. Experiments have proven that an addition of oxidizing chemicals accelerates the solution of the gold considerably. There can be no doubt that the oxidizing qualities of for instance permanganate of potash, ferri cyanide of potash, peroxide of sodium and other oxidizing chemicals may be of great advantage in extracting gold from pyrites and refractory low grade ores. It is certainly worth while in cases in which refractory ore is not tractable with success to make experiments in this line under the directions of a good and competent metallurgist.

I have perfect confidence that the extraction of gold from ores by cyanide will increase in this country for a good many years

to come, and that many lowgrade gold ore deposits, which were regarded as not payable heretofore, will become possible to be developed and worked successfully by the cyanide process, the process by which it became possible to increase the gold output of the whole world considerably, and which is one of the reasons that the United States take the lead today of all gold-producing countries, and which let us hope will be the case for many years to come, to the certain prosperity and high commercial standing our country takes today amongst the countries of the whole world.

To give a very good example in order to show how important this question of crushing the ore to its proper size for leaching purposes with Cyanide solution is, I only need refer to what occurred some years ago at the now world renowned Mercur Mine, not very many miles away from here. At that time, six to seven years ago, the former managers of this mine and Cyanide extraction plant, which by the way, was the very first plant for treating ore in this country by the so-called direct Cyanide process, were advised to grind the ore to a size of about 600 mesh in order to attain the highest possible extraction. The result was an extraction of only about 40 per cent of the assay value of the ore. This for some time proved quite a puzzle and was of great trouble to the managers. After many and not very successful experiments had been gone through, it was decided not to crush the ore so fine on account of the porous nature of the ore and its considerable percentage of Talc and Alumina, which lattar of course rendered the ore rather impenetrable for the Cyanide solution. The results were, that the coarser the ore was crushed the higher the extraction became, and today, while the ore is crushed only to the size of about ¼-inch square, one of the highest extractions known, about 85 per cent of the assay value of the ore, assaying on the average 15 to 18 dwts. per ton is gained.

During my last stay on the Rand in 1895 to 1896 I had the opportunity to convince myself that the classification and separation of the ores, according to size and specific gravity, before the treatment with Cyanide, was a great success. On my visit to the Transvaal in 1895 three processes were in use to recover gold from ore. First, Amalgamation over copper plates, by which most of the free milling ore was recovered (about 50 per cent of the assay value).

Second, subsequent chlorination of the concentrates from Frue vanners, and

Third, Cyaniding of the remaining tailings.

In 1897 the total output of the mines on the Rand amounted to over three million ounces fine gold, of which one-third, say one million ounces, wera recovered by the Cyanide process. That the amount of gold recovered by Cyanide has increased so considerably during the last years and that the Cyanide process has become quite a strong competitor to the chlorination process on the Rand is mostly due,

First, to the above-mentioned classification of the ore, and

Secondly, to the so-called double treatment of the ore.

I thought it well to say a few words about these two processes as in some cases they may be applied with advantage in this country. They may either help to increase the extraction or may lead to the successful treatment of ores which were not treatable before. On the Rand it was proven that,

First, a decided separation of the sandy ore from the slimes is necessary in order to obtain a good extraction.

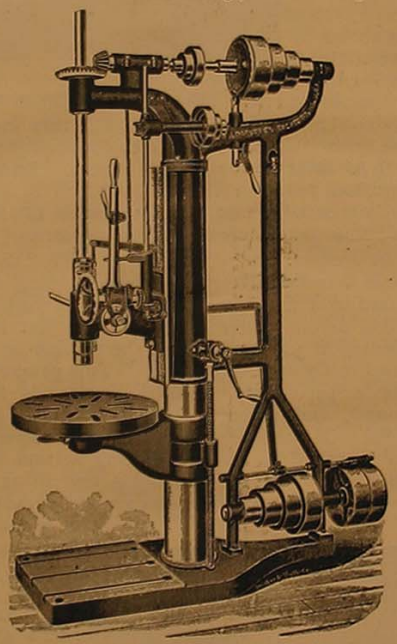
Secondly, that by classifying a concentrated ore into different groups of different sizes and specific gravity a much higher extraction is gained.

This separation and classification of the ore is done by passing the ore as it comes from the plates through a system of so-called Spitzlutten and Spitzkasten, apparatuses well known to all of you and which I therefore do not think necessary to describe in detail.

(To be continued.)

Barnes' Upright Drill.

A new drill, which W. F. & John Barnes Co., of 105 Ruby street, Rochford, Ill., has just built and are placing on the market, is the Barnes Upright Drill, No. 5, with 26 inch swing. It was produced in response to a very general inquiry for a sliding-head drill smaller than their 28 inch drill and it is thought this new machine will meet fully the requirements for a drill intermediate in size and capacity between the 25 inch stationary head drill and the 28 inch and 34 inch sliding head



BARNES' NO. 5 UPRIGHT DRILL.

drills. This new machine has been designed with special care, and it is believed to embody every feature necessary to make it a complete and perfect tool. The workmanship is thoroughly first-class in every respect.

The feed arrangement is specially strong, and provides for all the different feeds which can be used on a drill press. The cut shows very clearly the feed mechanism, and, as will be seen, the drill has power self feed with automatic stop, lever and worm feed, and quick return for spindle. The feature of hand lever feed on a sliding head drill, in combination with worm and power feed, is new and increases the usefulness of the drill. The spindle is fitted with the No. 3 Morse taper.

The dimensions are as follows:

Height of drill	7 ft.
Greatest distance from spindle to base	53 in.
Minimum	21 in.
Diameter of column	7 in.
Diameter of spindle	1 11-16 in.
Width of column face	6 in.
Travel of sliding head	21 in.
Travel of spindle	11 in.
Diameter of large pulley on cone	10 in.
Diameter of small pulley on cone	4 in.
Face of pulleys	3 in.
Tight and loose pulleys	10x3 in.
Diameter of crown gear	7¾ in.
Diameter of bevel pinion	3¾ in.
Face of tooth	1¾ in.
Ratio of back gearing	5½ to 1.
Required floor space	21x52 in.
Weight	1350 lbs.

In our issue of July 15th, on page 8, in our review of the second edition of *Gas, Gasoline and Oil Engines*, by G. D. Hiscox, we neglected to give price of same, which is $250. The publishers, Messrs. Norman W. Henley & Co., of 132 Nassau street, New York City, will forward the book to anyone on receipt of price.

The Consolidated Kansas City Smelting and Refining Company have met with phenomenal success in marketing their new biproduct, the Alchemist brand of blue vitriol. In November of last year they improved their copper plant in many ways, increasing their capacity to 550 tons of blue vitriol per month.

The present year was started under the most auspicious circumstances, as they were awarded the entire contract for the consumption of the Western Union Telegraph Co. A good market has been found in the East, Old Mexico and Canada. Several shipments have also been made to the Mediterranean coast. The Alchemist brand of blue vitriol is put on the market in the form of large and small crystals. Its great popularity is due to the high percentage of copper, and to the almost entire absence of impurities.

The Colorado Iron Works Company are working their plant to its full capacity, and making shipments to nearly all parts of the world. Among recent shipments were two 42x144 silver-lead smelting furnaces, with complete smelting equipment, to the Tasmanian Smelting Company, located on the Island of Tasmania. This order filled six cars. This company is also building a 42x144 silver-lead smelting furnace, for the Hanauer Smelting Company, of Utah; and a 45x144 silver-lead smelting furnace, for the Germania Lead Works, Salt Lake City, Utah; both with complete smelting equipments. A large jacket smelting furnace for the Canadian Pacific R. R., British Columbia; one for the Great National Mexican Central Smelting Company, Old Mexico, and one for the Mountain Copper Company, in California.

This firm has established a reputation for its smelting furnaces because of superior design, workmanship and material, which brings orders from all over the world.

The name of the crude mill for crushing ore, the correct orthography of which is "arrastre," is written and pronounced in many different ways, some of them amusing. The senior editor of the *Transcript* once wrote a letter for publication in the east, from a mining camp in the Death Valley region, in which he mentioned a "raster." He got the name by ear, from an experienced miner, and being a hundred miles from any kind of written authority, so wrote it.—*San Bernardino Transcript.*

While *The Transcript* devotes considerable space to mining news, and furnishes some first class mining literature, it is apt to be mistaken. If the senior editor of *The Transcript* will look farther into the matter, he will find that he has not spelt the word rightly as yet.

THE PROVO-MERCUR 40,000 VOLT TRANSMISSION.*

BY LEON W. BLY.

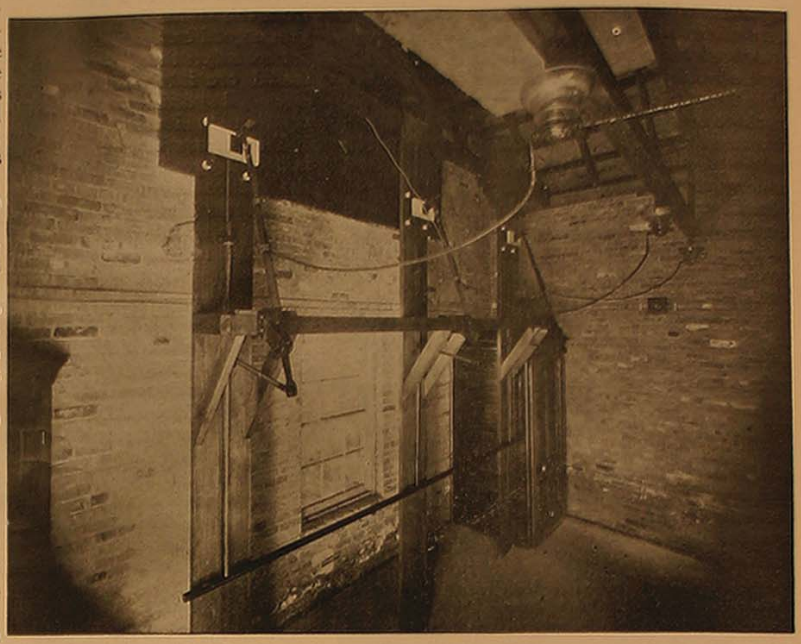
But few, even in the electrical transmission fraternity, are aware of the fact that the highest voltage employed in the commercial transmission of power over a long distance is that which is now operated on the lines of the Telluride Power Transmission Company between Provo canyon and Mercur. Utah. The Telluride people are pioneers in the field of extremely high voltage transmission and for several years have experimented conjointly with the Westinghouse Electric and Manufacturing Company, on transmission lines with potentials ranging as high as 120,000 volts.

The line used for carrying out these experiments was a special one extending from the Telluride Company's power house near Ames, Colorado, to the Gold King mine and having a length of 11,720 feet. The route of this line was over a rugged country subject to a heavy fall of snow in winter and rain with severe lightning in the summer. The poles were placed one hundred and eighty feet apart and supported three circuits of No. 8 galvanized iron wire. Practically all the different varieties of cross arms, pins and insulators to be found on the market were tested, as were also many new models of these appliances, devised at the time, and during the test runs, the condition of the atmosphere and of the line in regard to snow. rain and humidity were carefully noted. Up to the present, the results of these important experiments are reserved and every effort to secure the data deduced has been unavailing.

Reverting to the Provo-Mercur transmission, the plans of the Telluride company contemplate the early installation of two thousand horse power in two units of 750 kilowatts each, to furnish power and lights to the mining interests in and about Mercur and Tintic, Utah. These two districts, which are perhaps twenty miles apart, are respectively thirty-two and forty-six miles from Provo Canyon, where the power house is located.

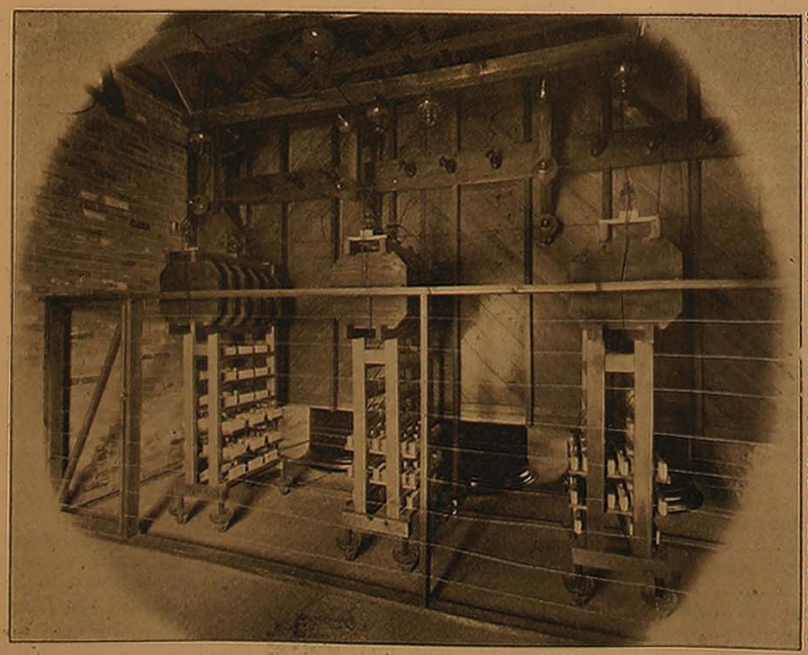
*Journal of Electricity..

The Provo-Mercur transmission line is the one which has been placed in operation, but work has been commenced on the construction of the independent line from Provo Canyon to the Tintic district, which will be, as stated, forty-six miles in length. After the Provo-Tintic line is completed, the sub-stations at Mercur and Tintic will be connected together by a subsidiary transmission line so that in case of accident to either main line from Provo, service may be continued without interruption to both places. Immunity from pole line trouble seems to be perfectly secure by this arrangement as the two pole lines takes entirely different routes.



BREAK SWITCH FOR 40,000 VOLTS ON THE PROVO-MERCUR TRANSMISSION.

At present, one 750 kw. type "A. P." three phase General Electric generator is being operated by a flexible connection to a turbine wheel driven under a head of 125 feet and running at 300 rovolutions, the turbine being temporarily hand-regulated. This generator has a periodicity of sixty cycles, is star wound, and gives a phase potential of 800 volts. Of the four 250 kw. raising transformers installed in the generatiug station, but three are in use, the remaining one being as reserve, and its connections are so arranged that it can be substituted in service for either of the other transformers at a moment's notice. The normal primary potential applied to the raising transformers is 462 volts, the normal secondary being 23,100 volts. As is the case with the primaries, the secondaries are connected in star, hence the three-phase high tension terminals have a phase pressure of 40,000 volts.



FUSES, CHOKE COILS AND LIGHTNING ARRESTERS ON THE PROVO-MERCUR TRANSMISSION.

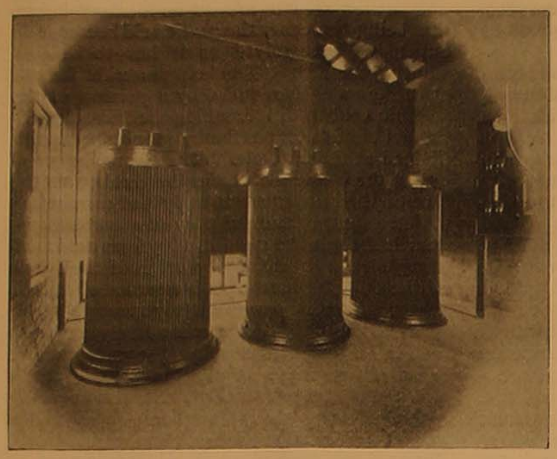
The principal material used in the insulation of these high tension transformers is muslin and fullerboard, blocks of maple wood being used to separate the coils. The transformer cores and coils are immersed in mineral seal oil, with no other cooling device than that of the natural radiation of heat from the surfaces of their cases. This radiation is, however, very great because of the fact that the surfaces of the cases are rather deeply corrugated. To be exact, the corrugations are 2½ inches deep and one inch wide. The general appearance of the high tension transformers is shown in the illustration appearing on page 11, which also shows plainly the method of supporting the interior high pressure circuits.

The high tension leads are brought out of the tops of the tanks through walnut bushings, on the inside of each of which is a heavy porcelain tube extending from the top of the bushing down into the tank beneath the surface of the oil. The low tension leads are brought out at the sides pf the tanks and these low tension leads consist of two series of twenty-eight turns in multiple of two three-quarters inch by 349 mils strap copper. The high tension windings consist of 1400 of No. 9 magnet wire. These transformers, as well as the lowering transformers at the Mercur sub station, were built by the Wagner Electric and Manufacturing Company of St. Louis. Mo., upon the designs and specifications of the Telluride Power Transmission Company.

Tests made by the writer show the copper loss of the transformers to average about 2150 watts; the iron loss is about 3030 watts; the normal temperature at full load is 118 degrees above that of the surrounding air.

Three phase generation, three phase transmission and two phase distribution constitutes the scheme of the polyphase equipment, and all the three phase portions are star connected and the common center or neutral point of the star is grounded as will be described later. The line is protected by the Wurts non-arcing lightning arresters.

The line, which is carried on 35-foot cedar poles placed 125 feet apart, is of No. 5 B. & S., medium hard drawn copper, supported so as to form the points of an equilateral triangle



THE 40,000 VOLT TRANSFORMERS.

having six-foot sides. One of the three wires is placed on top of the pole and the remaining two are run on the respective insullators of a seven-foot cross arm with a separation of six feet between the pins. The wires are not transposed, and a metallic telephone circuit is carried on brackets at a distance of 42 inches below the cross arm.

The insulators are of a special type of triple petticoat glass, having two corrugations around the top below the groove designed to carry the line wire. This arrangement not only has the advantage of increasing the surface of the glass between the wire and pin, but it also protects a portion of the surface from extreme moisture during rain storms. The approximate dimensions of the insulator are 6½ inches across the base by 6 inches high, and the insulator is supported by a specially long locust pin made proof against moisture by being boiled in paraffine. Great care was taken to fill the pores of the wood thoroughly, to effect which the pins were kept in the tank in which they had been boiled until they had become thoroughly cooled, after which the surplus wax was removed and the surface of the pin was made smooth by dipping it again in very hot paraffine wax. These pins, being extra long, supported the insulator clear of the cross arm by five inches and the pin used at the top of the pole is two inches longer still, making the separation between the top insulator and the pole to be seven inches.

It appears obvious that an insulator of this design will offer a high resistance to a discharge over its surface, but should it be assumed that it could reach the lower edge of the outside petticoat, there would be little inducement for it to go further as the pin is at all times a good insulator and its surface is of such a nature that a film of moisture will not collect over it. On several occasions insulators have been shattered by marksmen, but it has been the experience that if trouble developed, owing to the grounding of the wire on the pin or cross arm, it would promptly rectify itself by the burning off of the cross arm, leaving the wire without support at that pole.

It will be interesting to note that at at each pole along the line one can hear crackling from static discharges at all times, and during certain atmospheric condition the insulators are dimly luminous with pale phosphorescence. The line itself, however, is non-luminous at all times except for the brush discharges which sometimes exist from points of the line, such as from the tips of the tie wires.

The lightning arresters, as before stated, are of the Wurts type. About twenty-five arresters being kept between the line and the ground. Six choke coils are used, and these are placed edgewise on top of the arrester racks, and as the latter are designed to be as compact as possible, they measure over all but two feet, by 3½ feet, by 7 feet high. One of these banks of lightning arresters and choke coils are connected in each line wire as shown in the illustration.

To be more explicit, the connections of the lightning arresters are arranged as follows: Six choke coils are coupled in series and cut into the line after leaving the transformers. For convenience, we will here designate the choke coils by numerals consecutively, coil number 1 being at the left and being connected direct to the line. On the left side of each coil, numbered 1 and 2, three Wurts arresters, each containing seven nonarcing cylinders, with about one-twentieth inch gap, are tapped off in series, there being thus two series of three arresters each, for the first two coils. The free ends of the two series of arresters from coils numbered 1 and 2 are closed together, the connection thus formed being termed "point *a*." Similarly the two series of arresters from coils numbered 3 and 4 are connected at point *b*, as are also the two series of arresters of coils 5 and 6 at point *c*. From points *a* and *b* are then carried a single series of five arresters, the ends of these series being joined at the point *d*, while from point *c* is run a single series of eight arresters which are connected to (at point *e*) the terminal of a single series of three arresters between *d* and *e*. Eleven choke coils therefore, intervene between point *e* and either of the six choke coils referred to, while from point *e* is continued a single series of fourteen arresters running to ground. About twenty-five arresters intervene between any choke coil and ground while a minimum of six arresters are across a coil.

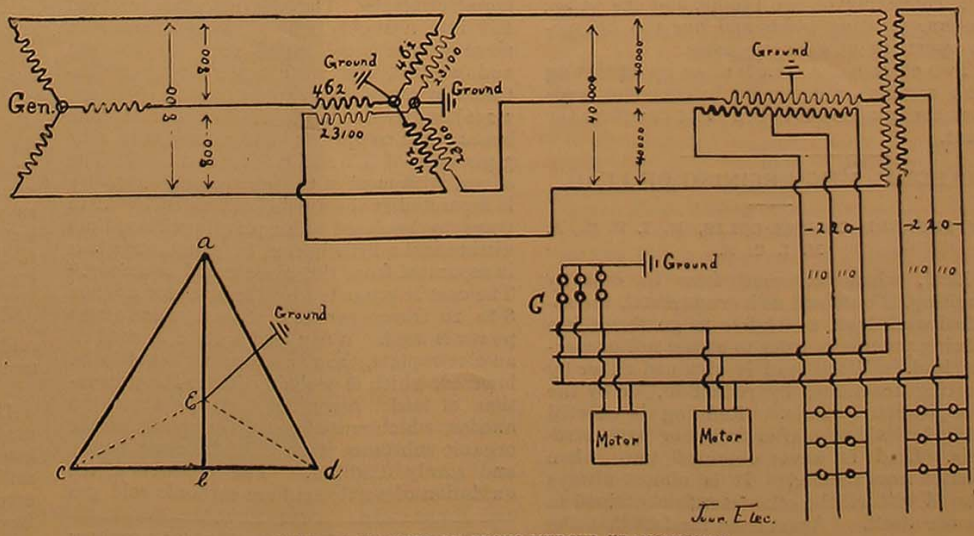
Two further features of interest, also shown in the engraving last referred to, are found in the fuses inserted in the high tension wires, and in the high tension switches used. Each of these three fuses consists of a single number 30 B. & S. bare copper wire, thirty-six inches in length, over which an asbestos tube is drawn. The fact that three such thread-like wires will carry a load of over seven hundred horse power, is as incredible to the layman as it is evident to the electrical engineer, who fully realizes the significance of transmission at a potential of 40,000 volts.

The high tension switches, illustrated on page 10, are inserted on each of the three line wires. They are rigidly connected together, so as to be operated by a common switch bar as shown, and each give to a six-foot break, the separation between the switches being five feet.

The sub station now in operation is installed in the Golden Gate mill, at Mercur, which is believed to be one of the largest, if not the largest, cyanide mill in the world. Its electrical equipment, aside from the induction motors used for mining and milling purposes, and as about to be described, consists of three, 300-kw. lowering transformers, by means of which the 40,000 volt three phase line current is reduced to 220-volt, two phase current, used for lighting and for operating Westinghouse two phase type "C" induction motors. The plan of connections for the step-down transformers is shown in the sketch "outline circuits," which is a comprehensive outline drawing of the electrical connections of the entire equipment from the generator to the ultimate motors and incandescent lights operated by the system.

These lowering transformers are the same in general design as the raising transformers in the power house at Provo Canyon, and differ therefrom only in capacity and voltage. It will be noticed, too, that, as in the case in the generating station, an extra transformer is installed for emergency use, and its connections are so arranged that it can be substituted for either of the other lowering transformers with celerity.

The transforming of three phase current to two phase current, and vice versa, by two transformers, is generally understood, and will therefore not be taken up. As previously stated, the neutral point of the three phase system in both the generator and the high tension side of the raising transformers are grounded, and the practice of grounding is carried out even in the low tension distribution circuits in the manner to be shown.



OUTLINE CIRCUITS OF PROVO-MERCUR TRANSMISSION.

The neutral point of a three-phase circuit, in a three-phase two phase transformer, may be determined graphically by erecting the perpendicular *b a* from the center of the side *c d* of the equilateral triangle shown in the corner of the plan herewith of circuit eonnections, and upon this perpedicular, *b a*, locate the center of the trriangle, as shown at the point *e*. Let the line *a b* represent the 100 per cent side of a three-phase two-phase transformer, when the line *e c* will represent the 86 per cent transformers, and the point *e* will be ono-third of the length of the line *b a* measured from *b*. It is at this point that the tap for the ground is brought out, and it is located in the three-phase two-phase transformers at one-third of the turns of the 86 per cent transformer, from the side connected to the center of the 100 per cent transformer.

The 220 volt secondary is also grounded through incandscent lamps, as shown at *C*, where two 110-volt lamps are connected in series between either of the three wires of the two-phase distribution, and the ground. Moreover, a tap is brought out from the center of each of the the single phases comprising the two-phase system, and this tap constitutes the neutral wire of the Edison three wire system, which is used at Mercur for incandescent distribution service. Lighting service is taken from both transformers, great care being exercised to keep the entire system balanced, not only as an Edison three wire system, but also to keep each of the two phases balanced with the other. The thoroughness with which the various portions of the high tension three phase system is grounded, as well as the effectual grounding of the 220-volt system, leads to the belief that no danger from shock is presented.

A further feature that will excite surprise is the fact that current is carried from the lowering transformers to the center of distribution in the Golden Gate mill and hoist house by a three-conductor concentric cable, each of the three conductors having a sectional area of 1,000,000 circular mils. The length of this cable leading into the mill is 220 feet, and from its terminal is tapped off leads for six induction motors, consisting of one 150 hp. operating rolls, etc.; one 50 hp. motor operating the roasters; one 30 hp. motor operating pumps; two 15 hp. motors operating blowers, and one 10 hp. motor in the machine shop. The length of cable leading into the hoist house is about 60 feet, and from its terminal is tapped off leads for three motors, consisting of one 150 hp. and one 75 hp. motors operating hoists and one 100 hp. motor operating an air compressor.

Two other motors, each of 50 hp. operating rock crushers, are run on independent leads from the transformers, and these complete the plant.

ELECTROLYTIC REFINING OF LEAD.

BY SHERARD COWPER-COLES, M. I. E. E., A. M. I. C. E.

Lead, when recovered from its ores by smelting, is obtained as a crude metal, the so-called work lead, which has to go through a refining process in order to obtain soft or market lead. Work lead is obtained either by roasting reactions, by reduction, or by the precipitation process. Refining is effected either by oxidation after fusion or by electrolysis. Lead is never obtained pure when smelted from the ore. It is almost always alloyed with all the other metals contained in the ore itself. Apart from the fact that the useful properties of the metal are affected by these other metals, it is, of course, advisable for economical reasons to recover the precious metals present, such as silver.

One of the first processes worked on a commercial scale for the electrolytic refining of lead by electrolysis was that of Keith. In this process the crude or work lead is melted at the lowest possible temperature in iron kettles from which it is tapped into molds. The anodes thus produced are fastened to metal rods by suitable clamps, and enclosed in close-fitting bags of coarse muslin. The electrolyzing cells are made of wood or iron; the cathods are thin metal plates attached to rods in a similar manner to the cathodes. The electrolyte is composed of lead sulphate dissolved in an aqueous solution of acetate of sodium; it is made by electrolyzing with lead anodes a mixture of 1½ lbs. of acetate of sodium, 2¾ ounces of sulphuric acid and 1 gallon of water, and is heated to 38° C. The sulphuric acid attacks and the acetate dissolves the lead, zinc and iron of the anodes. The zinc and iron, being eletro-positive to lead in the liquid, are less easily reduced to metal and accumulate in the solution, and when dissolved in considerable quantity are, to some extent, deposited as oxide on the cathode, the current density employed being about 1.86 amperes per square foot. The lead which is deposited on the cathode is crystalline in form and separates continually from the plates, a space being left in the cells for its accumulation. When the anodes have been disolved, the bags suspended from their supporting rods are carried to a reservoir and the residual solid matter from the plates is washed and returned to the melting kettles. The slimes suspended from the wash water are allowed to settle, the water is drained off, and the residue filtered. The slimes usually contain antimony, arsenic, silver, copper, gold and iron. A process that has been recently tried on a commercial scale is that of Tommasi. In this case, the electrolyts is the double acetate of lead and potassium (or sodium), the anodes are crude argentiferous lead, and two of these are opposed to a copper or aluminum alloy cathode, which is in the form of a disk rotating at the rate of from one to two revolutions per minute.

These disks are about 10 feet in diameter and three-quarters of an inch thick and are half immersed in the liquid. At the upper part are scrapers which serve to detach the small spongy crystals of lead which form during electrolysis. The crystals when removed fall into channels which convey them to a sieve of wire gause where they are drained and washed, the wash water being concentrated by evaporation to 20 Baume (sp. gr. 1.256) and used again in the electroplate. The lead is then compressed and mixed with 2 or 3 per cent. of charcoal powder and fused. The silver, with most of the arsenic and antimony is separated at the anode, and is collected in trays to be fused subsequently with sodium nitrate and a little borax, by which the silver is separated from the arsenic and antimony.* The cost is estimated by the inventor at from 8 to 10 francs per ton of lead when steam power is used. When lead acetate is used as an electroplate, the resistance is found to be lowered, which is probably due to the prevention of lead peroxide deposits upon the anodes, which must be at the expense of the organic substance itself which becomes slowly and surely oxidized. The products of the oxidation of acetic acid are carbonic acid gas and water, which are of no intrinsic value. this being the case, the acetic acid becomes an expensive electrolyte as it has to be constantly renewed. The lead peroxide formed at the anode is reduced by a portion of the organic acid to oxide, which then dissolves in the acid and becomes finally reduced to metallic lead at the cathode. The impurities present in the crude metal and the oxides on the face of the anodes are usually bad conductors of electricity, and, if they do not become detached from the anodes, they form an insulating coat over a large portion of the anode surface. The natural consequence of this is that the current passes mainly through those parts of the plate that remain freely exposed, and so the current density becomes greatly increased at these portions with the result that the anode is rapidly riddled with holes. The addition of fluid carbonic acid when mixed gradually with sulphuric acid, and digested for some time at a temperature of from 50 to 100° C. easily converts it into cresol sulphuric acid, which is soluble in water, and is capable of forming soluble salts with lead. These salts have been successfully used for the deposition of lead.

Maxwell Lyte has suggested converting the lead into chloride and electrolyzing it in the molton condition. Crude lead is fused and oxidized by a blast of air in a converter, the oxide is then stirred with hydrochloric acid in earthenware vessels until it is converted into chloride. Any silver compound associated with the lead, salt or oxide treated, is chloridized and is extracted from the mass by the application of strong hydrochloric acid or brine.

*The arsenic and antimony are oxidized to the maximum and unite with the soda to form scoria.

Concerning Chlorination.

VANCOUVER, BRITISH COLUMBIA, July 13, 1898.

TO THE EDITOR
MINING & METALLURGICAL JOURNAL,
Stimson Block, Los Angeles, California.

SIR:—When pointing out the error in the description of the Chlorination Process, I omitted to give the equation showing the reaction which takes place when the lime chloride (not lime, as inadvertently stated by me) is acted upon by hydrochloric (muriatic) acid as follows: $CaOCl_2 + 2HCl = CaCl_2 + H_2O + Cl_2$. Yours faithfully,

(Signed) J. O'SULLIVAN,
Chief Assayer and Chemist, The British Columbia Agency L'td.

While hydrochloric acid and chloride of lime are used in chlorination processes, the combination is not received with as much favor as the combination of sulphuric acid and chloride of lime, $CaOCl_2 + H_2SO_4 = CaSO_4 + H^2O + Cl_2$, for the reason that the difference in price of sulphuric acid and hydrochloric acid which is as about 10 to 19 in favor of sulphuric acid, or nearly one half less. Of course, we have to take into consideration that it requires more sulphuric acid than it does hydrochloric acid to do a stipulated amount of work, about as 73 to 98; in other words, 73 parts of hydrochloric acid will do as much work as 98 parts of sulphuric acid, but it can be readily understood that the difference in price more than balances the difference in quantity.

The fact of the matter is hydrochloric acid is principally used in laboratory work, and seldom on a commercial scale for the treatment of ores.

Due principally to the fact of concessions made by the smelters and railroads, and the leasing system now in vogue, also to the new mills and concentrators that are being erected, many of the mines which could not have been operated after the panic are now in a position to make a profit.

THE ELECTRO CHEMICAL INDUSTRIES OF ENGLAND.*

JOHN B. C. KERSHAW, F. I. C.

Twenty years ago the industrial applications of electricity in Europe in the domain of chemestry and metallurgy were limited to two manufactures—that of electroplate, a business in the hands chiefiy of the famous Birmingham firm of Elington Bros., and that of refined copper. The latter industry was carried on upon a very small scale of operations, and the combined output of the Pembrey and Hamburg refineries — the two largest at this date—did not much exceed 1,000 tons per annum, while the total number of refineries in Europe was only six or seven.

Ten years later, electro-plating and copper refining were still the only two electro chemical industries. But the latter industry has steadily increased in Europe under the stimulus of the demand created by electrical engineering for the purest form of copper, and the electrolytic method of copper refining had been introduced into the United States by the Balbach Company of Newark and by the Baltimore Smelting and Refining Co. At this date there were four electrolytic copper refinesies in operation in England, with from eight to twelve scattered over the Continent of Europe.

The progress that has been made since 1885 has however been remarkably rapid, and while ten years ago there were many who believed electricity would have but a very minor role to play in the chemical and metallurgical industries, the enormous expansion of the electrolytic copper refining industry, and the marked success which has attended the use of electrolytic methods in the manufacture of aluminum and chlorate of potash, have now reduced the number who hold this belief to a very small minority of the community. This change in the views of practical men with regard to the possibilities of electricity as an agent for promoting chemical reactions upon a manufacturing scale, is due to the rapid growth of the past ten years.

There are now no fewer than eighteen distinct electro chemical or electro-metallurgical manufactures carried on in different parts of Europe and America in over 150 manufactories, while the production of one article—electrolytic copper — has increased from between ten to twenty thousand tons in 1887 to over 150,000 tons in 1897—that is, to an amount nearly equal to one-half the total copper production of the globe.

*Electricity.

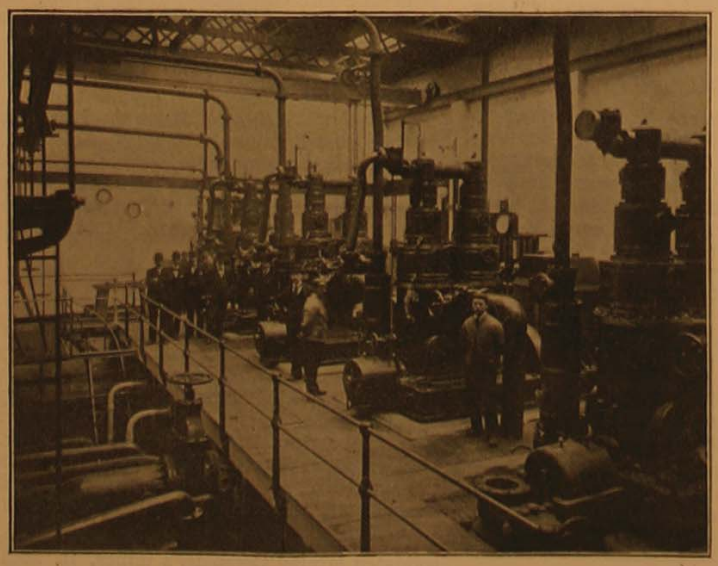
This progress would have been impossible except for the cheapened sources of electricity that are now available when current is required in large quantities.

The experience gained in the period 1880-1890, when electric lighting was absorbing all the attention of electrical engineers, has led to valuable improvements in the efficiency of both engines and dynamos, and the more recent devolopment of large water powers for manufacturing purposes has still further tended to reduce the cost of electrical energy. This is today being produced for manufacturing operations at a cost which twenty years ago would have been considered below the limits of possibility.

CELL ROOM IN THE CASTNER-KELLNER ALKALI WORKS, WESTON POINT, ENGLAND. CAPACITY 1,000 H. P.

Great as the electric lighting industry has become in both Europe and America, there are only a few lighting installations in either continant with a dynamo capacity equal to that of some of the larger and more important industrial undertakings of the character now under consideration.

In these electro-chemical industries, single power plants of between 2,000 and 4,000 HP. are common; and the greater portion of the power to be developed from the numerous water-falls of both the New World and the Old will undoubtedly find utilization in these comparatively new industries.



ENGINE AND DYNAMO ROOM OF THE CASTNER-KELLNER ALKALI WORKS, WESTON POINT, ENGLAND.

In England, owing to the lack of large natural water-powers suitable for industrial development, the electro-chemical developments that have occurred have with two exceptions had to depend upon coal for their supply of the electric current; and two of these undertakings possess steam plants of the most modern description for generation of their electrical energy.

The Castner-Kellner Alkali Co.—Two views are given of the works of this company at Weston Point, Lancashire. The company was formed in 1896 with a capital of $1,440,000 and the manufacture of caustic soda and bleach by the first 1,000 HP. installment of plant was commenced early in 1897. The results of the working of this plant have been satisfactory, and the extension of the works to the originally designed capacity of 4 000 HP. is now proceeding. The shares of this company were quoted at a premium at the commencement of the present year, a fact that speaks well for the confidence of the investing public in the future of the undertaking. The process depends upon the decomposition of a solution of common salt by means of the electric current, mercury being used as cathode material and carbon for anodes. By a mechanical device the cells are subjected to a periodical tilting movement which brings the sodium amalgam formed at the cathode into contact with water, and, whilst regenerating the mercury for use in the cathode compartment of the cell again, produces a solution of sodium hydrate practically quite free from sodium chloride. The chlorine liberated at the carbon anodes is conducted away, and is used in the ordinary manner for the manufacture of bleaching powder.* The English Castner-Kellner Company has made a deal with the "Deutsche Solvay Werke Aktien Gesellschaft" whereby the latter company has undertaken to accept delivery of the whole of the bleaching powder product at Weston Point during three years at a fixed price. This arrangement of course gives stability to the position of the Castner-Kellner Company and ensures a market for its products. Owing to the output of bleaching powder by this company and by the other electrolytic alkali company at St. Helens, the market price of 35 per cent. bleaching powder has already dropped about $5 per ton, and a further fall may occur during the present year. Some difficulty has arisen, it is believed in the conduct of the electrolytic process, due to the impurities of the brine pumped from the Cheshire salt mines and the second 1,000 HP.

*For further details of this process, see *Electricity*, September 8th and 15th, 1897.

installment of plant is to be used for the production of caustic potash from Stassfurt potassium chloride. It may interest some of our readers to know that this process is now at work at Niagra in the factory of the Mathieson Alkali Company, and 1,500 HP. is now utilized at this spot in the production of caustic alkalis and chlorine products. A minimum royalty charge of $19,200 per annum is to be paid by the Mathieson Company to the Aluminum Company of Oldbury, England, who at the date of this agreement were the owners of the American rights of the Castner-Kellner process.

CORRESPONDENCE

WISCONSIN.

WEST SUPERIOR, WIS., July 21, 1898.

EDITOR JOURNAL:—The North Wisconsin copper mine, of Douglas Range, 15 miles south of Superior, has arranged to continue the development work begun last fall. The 16-foot amygdaloidal vein carries 1 to 2 per cent native copper. The company has sunk 64 feet on the vein, and has drawn a shaft of drift 26 feet along the vein. Several other pits have been sunk on the property. Considerable interest is shown locally on the formation, and much prospecting has been done the whole length of the range, which discloses at many places promising outcroppings of cupriferous rock; the formation extends in an east and west direction across Douglas County, Wisconsin, and is exposed again southward from the Michigan line to Minnesota. KIRBY THOMAS.

Miscellaneous Mining News.

ALASKA.

In a letter to a Southern California mining man an assayer writes: "Sunrise City is at the head of Cook's Inlet, and there are a lot of people here but few miners, and the majority are waiting to get back to the States. They can't find gold on the bushes and have to pack everything on their backs in going about, and this makes calamity howlers out of most of them pretty quick. The company I am with has bought two claims for $3,000. They are considered among the best here. I have been prospecting them for the past ten days and they prospect pretty well all over. I can make $5 per day and not reach bedrock. Bed-rock is about 17 feet from the surface and both claims can be worked without hindrance from water.

ARIZONA.

From Big Bug.

The Little Annie has stopped most of her work until an air compressor and Burleigh drill can be obtained. Then the Providence Mining Co. will prospect the entire Annie mountain. This company is thinking of placing a smelter about a mile down Big Bug from their mine.

Mr. Kent and son, owners of the Lottie and Postmaster mines, are expected from the east in a few days. Mr. Kent is now having a tunnel run 600 feet through the mountain in order that the Lottie mine may be drained of its water. This tunnel is now about 400 feet long and six men are constantly at work on the east end of it.

The Henrietta mine has been taken in charge by Mr. Henry, who will pay the indebtedness on this mine and again resume work.

The Swindler mine, owned by Mr. Brindley, was bonded to Mr. Shirley July 15 for an unknown amount, but it is to be paid at the end of six months.—*Arizona Republican.*

CALIFORNIA.

KERN COUNTY.

The famous Long Tom property, near Bakersfield in Kern county, was recently sold to a Pittsburg syndicate for $160,000.

J. W. Waltham has taken a bond on the Golden Bar mine, and has already installed a gasoline hoist and very systematic prospecting work will be done. A new innovation in the methods of mining in this camp will be introduced in the shape of a female engineer. Mrs. Waltham will have charge of the hoist and a general superintendence of the mine. As she adopts while on duty the regulation overalls of our profession, us "Hardrockers" extend to her the glad hand and wish her luck.

The most important find in the camp so far has been the new strike of suphuret ore in the Little Butte, at a depth of 500 feet. The ore body shows a five foot vein of dark, close-grained, bluish-looking quartz and mills about $15 free gold with the sulphurets worth about $88 per ton. More than anything else it shows the permanency of the ledges as for the pitch of the ore chute the same vein passes under the Kinyon and Wedge only at a greater depth. The Little Butte people are feeling mighty good over their prospects and employes take renewed courage.— *Miner.*

LOS ANGELES COUNTY.

The reorganization of the Red Rover Mining and Milling Company has taken place, and preparations for the commencement of active operations on the Red Rover mine at Acton have been made. The former superintendent, Mr. Gilbert, said there was a considerable quantity of ore in the bottom of the sixth level that would mill between $5,000 and $6,000 per ton. The mine is well developed and has a fine plant of milling machinery, besides an extensive water works plant, all of which has been paid for from wealth taken from the mine. The company is about to put in a still larger water works on Gleeson Mountain, and expect to supply the town of Acton with water.

Frank McCann and others are about to erect a cyanide plant on Gleeson Mountain, to do custom work. The whole of the Cedar Mining District is known to abound in cyaniding ores, which, with a plant to work them, will bring that section prominently to the front.

RIVERSIDE COUNTY.

The stamp mill at Dale City, belonging to Ingersol, Esler & Reitz, is now erected and began to stamp ores this week.

H. C. Steele of the Desert Queen mine has returned to the city on account of illness. The work on the mine still continues.

The tailings of the Desert Queen mine will be cyanided in the tanks of the Old Virginia mine by Jackson Steele, who has purchased them.

SAN BERNARDINO COUNTY.

J. C. Littlepage and William Van Slack have returned to San Bernardino from their mine in Morengo district, where they ha been doing some work. They intend to p in a five stamp mill in September.

A number of miners came down to San Bernardino from the Rose mine last week. They report great activity around the mines, and the discovery of a good body of ore at the seventh level, which averages $30. The mill is not running on account of the scarcity of water, but workmen are now engaged in boring a 200 foot well in search of a good supply.

TUOLUMNE COUNTY.

The Brewer & Adams.

One of the greatest strikes the county has seen in a long time was made the first of the week in this mine, some of the ore extracted showing a value of $15,000 per ton. The property is situated on the west side of Turnback Creek, and is an extension of the Pinenut.

COLORADO.

Idaho Springs.

The Gold Medal mine, on the east of Seaton mountain, is running a cross-cut tunnel from the gulch some 600 feet below the main shaft. This tunnel is now in ten feet, and will be driven continuously for the eighty feet which are between the breast and the Gold Medal vein. As soon as the vein is reached it will be drifted on for 1,800 feet until a connection is made with the shaft. This property has produced some remarkably high-grade gold ore and can be relied on to live up to its reputation in the future. Mr. Emigh is the superintendent.

E. P. Blaisdell and Charley Corkett are sinking surface shaft on the Pride of Cascade lode, Ute creek, and are obtaining at grass roots quartz liberally sprinkled with chlorides, carbonets, sulphurets and some live mineral. The indications are flattering for an old-time Ute creek surface pocket and Blaisdell feels quite elated.

Crystal Items.

Seven men are at work at the Burke on Mineral Point, Gunnison county, getting the new tunnel under way in good shape. Work will be carried forward vigorously, and probably a contract will be let on the tunnel to drive it to cut the ore.

Two men have been added to the Inez force and we trust it will only be a few days until the force in this property is doubled. The present showing in the Inez is such as to lead one to expect good things to result from a comparatively small amount of development work.

Leadville Notes.

The Preston Mining and Milling Company, operating a large territory on Long and Derry hills, are about to push operations with three shafts. Ore has already been opened up which samples thirty ounces silver, 15 per cent. lead and moderate values in gold. Mr. Darlington, of Kansas City, a heavy owner in the enterprise, visited the mine recently and seemed to be well pleased with the outlook.

The present lessees of the Nisi Prius Consolidated Mining Company's mines, in addition to the extensive work being done on the Hall shaft, are preparing to take the water out of the Crown Point shaft so as to get at sev-

eral small streaks of very high grade ore left when their property was formerly worked. The profits from the Carbonate workings will enable the operators to unwater the Crown Point shaft.

IDAHO.

The rolls for the Black Cloud concentrator, near Wallace, Idaho, arrived last week, and were at once taken up to the mill and placed in position. This places the mill in order for active operation and work was started on August 1st.

W. C, Squires, Talcott and E. D. Squires are the discoverers of a very promising mining claim in Lawyers' canyon, in the deep gorge about five miles from Nez Pierce City. The ore assays 83 ounces silver and 11.10 in gold. Total, $227.60.

W. R. Mix and John P. Mix, of Moscow, will leave for Florence to continue development work on the Red Bird and Double Standard mines in that camp. W. R. Mix, who is superintendent of the company now developing the Red Bird under bond, spent the past winter sinking a shaft on the property. He also crosscut 100 feet on the ledge which at a depth of 130 feet is two and one-half feet wide. During the present summer several hundred tons of ore from this shaft will be milled.

MICHIGAN.

The Quincy Mining Co. has declared a dividend of $3.50 per share, payable August 10, to stockholders of record on July 22. The last dividend paid was $3 per share, in February, 1898. The amount of the present dividend is $350,000, and it will bring the total amount paid in dividends by the company up to $10,120,000.

The Wolverine company last week bought eighty acres of land directly west of the mine owned jointly by the Shelden, Douglas and Wolverine companies. The Kearsarge lode dips into the land and its possession will enable the Wolverine to mine to a depth of 5,000 feet. The price paid was $130,000.

MINNESOTA.

The hearing over the reduction of iron ore freights from the Minnesota ranges to the lake ports has been in progress for a week, and so far the railroads have been ahead, except that the complainants have been able to show that the companies are making a great profit on the present rates. The hearing will continue two weeks longer.—*Engineering and Mining Journal.*

Wright-Davis Mining Company.

This company, with general offices at Sagi naw, Michigan, and operations in Minnesota, filed articles of association in Saginaw recently. The capital stock of $750,000 is held by the following people: A. W. Wright, C. H. Davis, W. T. Knowlton, G. M. Stark, E. P. Stone and A. Boutelle, all of Saginaw; J. F. Killorin, Duluth; Russell & Vincent, Minneapolis, and George F. Reynolds, Cheboygan, Mich.

MISSOURI.

Thos. Conner, John F. Wise and Joe Aldrich have purchased 40 acres of land near Central City of Mrs. Barnes, for $4,000. The tract adjoins the Missouri Central company's lease on the northwest. The land was purchased for its mineral value.

Bonshe & Company have leased the old Hickox farm south of Shoal creek and east of Redding's flour mill, and are taking out big chunks of lead ore from a drift six feet from the surface. Two men working two days took out 5,000 lbs. of lead ore.

On the Crown Point lease the Little Joe mine at Duenweg, is producing 20,000 lbs. of lead weekly with two men in the ground.

MONTANA.

The Old Glory mine, now in operation on a lease by J. Benton Leggat, is again on the list of producers. Mr. Leggat has made one of a series of shipments of ore to the Colorado smelter. Ore is being taken from a good-sized shoot at the 700 foot level and the returns show about 10 per cent. copper, 25 ounces in silver and some gold.

The southern portion of the mill at the Granite Bimetallic Consolidated Company's works, consisting of fifty stamps, has been started and is now running satisfactorily. The northern part of the mill has been shut down and is receiving a thorough overhauling. During the long shut-down the timbers and bolts have become loosened and it was necessary to replace a good many by new material, put in new foundations for the mortars in several places and make other repairs before it will be in first class running order.

The Blacktail district is 30 miles south of Libby creek. The ore is free milling. The formation is slate with occasional porphyry. Anaconda men own the Bell group, upon which the principal development consists of a main tunnel 100 feet, two tunnels 50 feet each and four shorter ones. These show the lead from six inches to six feet wide. It will probably average two feet. The Lucky Boy lies across the apex of the ridge and on Bramlet Creek slope and adjoining is the Lake claim, lying across the head of the creek. The former has a 50-foot tunnel. The Lake has one tunnel 25 feet, one 30 feet and a shaft 25 feet with a drift 25 feet long from the bottom.—*Helena Independent.*

NEVADA.

Nevada Mine Sale Suit.

Suit has been brought in the Utah United States court against Philo T. Farnsworth of Salt Lake City for the recovery of $110,751 alleged to have been withheld through fraudulent misrepresentations as the price paid for mining and other property in Ione, Nye county, purchased for a Nevada company.

There were two transactions alleged as fraudulent in the complaint. The first alleges that the company furnished Farnsworth $60,000 to purchase a stock of merchandise and other property at Ione for which he paid less than $20,000. The second charge is that defendent was intrusted with $130,000 to purchase the Ione Gold Mining Company's property for which he paid only $80,000, withholding the balance of the money advanced in both transactions.

The Nevada company, or rather its board of directors, also operate the Nevada Central railway, which runs from Battle Mountain to Austin. The company's mining property is principally situated in the Austin mining district in Lander county.

NEW MEXICO.

The *Herald* of Bland, New Mexico, published the following discription of the Cochiti cyanide plant:

The application of the cyanide process to the various ores found in the Cochiti district has been a difficult problem to solve, and the development of a suitable process is all that is required to make this one of the most important gold camps in the country because the immensity of the ore bodies has already been demonstrated. This the Cochiti Gold Mining Co.'s plant will unquestionably do. It is one of the most complete reduction works in America, and in the west is only equalled in completeness by the Golden Gate cyanide plant at Mercur, Utah.

Part of the mill has already begun operations and by the 10th of August the big plant will be running full blast.

The mill consists of steel frame and steel sheeted structures of a combined size of 350 x75 feet; a hoist house and gallows frame; a leaching house 180x75 feet, containing five steel solution tanks 12x8 feet, 12 steel leaching tanks, 26x8 feet, eight precipitating tanks 15x8 feet, troughs and pumps for returning the cyanide solution to the tanks above; two additional rooms, consisting of an assaying room 30x25 feet and a department 90x30 feet to contain launders and batteries; a furnace and boiler room 40x25 feet, containing two furnaces and boilers of a capacity of 100 horse power each; and engine room, 40x50 feet, containing machine shop, Ingersoll-Sargeant air compressor engine for operating drills in the mine, General Electric Co.'s dynamo with a capacity of 15, and a magnificent Corless engine made by the Edwd. P. Allis Co., with a horsepower of 160; a crusher and dryer house, 100x75 feet, containing two large ore bins of a capacity of 100 tons each, two crushers, eight roll feeders, two large furnace and rotary dryers, elevators, eight pulp rolls operating over two steel pulp bins of a capacity of 100 tons each. The two mill buildings, partly divided, are monstrous structures of steel with large girders and roof trusses gracefully light but strong. The mill is admirable adapted for the purpose, being most conveniently arranged, well lighted and ventilated, and is an excellent example of the great superiority of steel over wood for plants of this character. It is as near fire-proof as it is possible to build any structure. Besides being entirely of steel and masonry, it is lined throughout with asbestos sheeting. It sets in a cut out of solid rock, towering above the rear side, a face of rock some 40 feet high.

OREGON.

Mines of Cracker Creek.

It is stated that of the many prominent mining districts of Eastern Oregon, Cracker creek may be classed among the first. The North Pole, Columbia and E. & E. have given Cracker Creek wide fame, and now comes the Golconda, which promises even better than the older mines. The Golconda is off the market, and is in the hands of people who have money to develop it without taking out a pound of ore. Enough is known to safely assert that an ore body of unusual richness and extent has been opened up and that rush orders have been given, and men put to work to further develop the property and to put in a big mill, which it is asserted can be kept busy for an indefinite time on ore already uncovered.

The E. & E. is working about sixty men

in the mine, and one-third of that number in their 20-stamp mill. The mill is handling 80 tons of ore daily, reducing to concentrates at a ratio of 25 to 1.—*Oregon Mining Journal.*

SOUTH DAKOTA.

D. C. Boley has let a contract to run a 50-foot tunnel about 25 yards from the shaft in Blacktail gulch, to D. H. McDonald and N. S. Peck.

The Keystone mill is being enlarged at present by the addition of 20 more stamps. Ed- Major, who built the Kildonan, and the St. Elmo, is superintending the work.

Chas. H. Lockie and Chas. Graham have purchased the lease formerly held by Thomas Adams on part of the Dakota Maid. The new owners intend to put a force of men at work sinking on both shafts.

Work is progressing as rapidly as possible on the chlorination works at Rapid City. The boilers were tested last week and the familiar sound of the old steam whistle brought a hearty cheer from the citizens of Rapid. Col. Day thinks everything will be in readiness for the reception of ore in three or four weeks. —*Black Hills Mining Review.*

UTAH.

The *Mining Reporter*, of Denver, has a very interesting article from one of its correspondents, in the La Sal mountains of Utah, from which we take the following extracts:—

"There is probably no new mining section in the western country of which there is so little known as the La Sal district, bordering on the western part of Colorado. Many contend that this promising section of country belongs in a greater part to Utah, but as yet no Utah men have shown a disposition to develop its various resources. In fact, there are no class of miners and prospectors developing and exploring this section but Colorado men.

The La Sal range proper is divided into what is known as the north and south divisions, separated by a low pass called Geyser pass.

Very little prospecting has baen done in the south division, yet one of the biggest copper mines of the country is being developed there, the Big Indian property, recently purchased by Ed. Loose and others, of Provo and Salt Lake, from Capt. May and S. N. King, two well known San Juan, Colorado, mining men. There is a big country between Geyser Pass and the south end of the mountain, and from reports, some rich gold and copper veins are being discovered."

WASHINGTON.

Colville Reservation.

Some good reports continue to come in from Sheridan Camp, although not much development work is going on at present. Snyder & Carter's claims show up well, as do several others along the main ledge. The high assays come from narrow seams in the ledge matter, but it is believed that these rather meagre veins will widen as depth is reached. All those having prospects at Sheridan are confident of finding rich and large deposits at lower depths. The latest assay from there shows $65 in gold and 920 ounces in silver.—*Miner and Electrician.*

FOREIGN MINING NEWS

BRITISH COLUMBIA.

"Since the Canadian Pacific bought the Trail smelter, it has been overhauling and enlarging it. It is being changed from a two to a five-furnace plant, so that it will handle from 750 to 1,000 tons every twenty-four hours, and will treat not only sulphide but silver-lead ores from the Slocan. The entire plant will be run by electricity, for they are now equipping it with motors. They have a plant of 400-horse power in the town, and are bringing in wires from the Kootenay Power Company's plant at Bonnington Falls on the Kootenay River, which will develop 10,000 horse power, and will supply the whole district. The company has reduced the cost of freight from Rossland to Trail, and of treatment at the smelter from $11 to $7.50 a ton, and will make lots of mines pay which would not pay at the old rates. Some of these have begun development, and will eventually ship ore. The War Eagle is putting in an electric plant and will be the first to use that power.

A Good Showing.

The mines in Rossland are turning out ore in a manner which promises to fulfill even the most sanguine prediction as to the future of the great camp. The War Eagle is now sending out about 1200 tons per week, and when machinery, now in process of installation, is in working order, the output will be materially increased. The Center Star will join the ranks of the steady shippers as soon as the new electrical hoist is in place. The Iron Mask is shipping regularly as is the Monto Christo. The Le Roi is about to increase from 200 tons per day, and it is stated that the Columbia-Kootenay will soon join in increasing the already great stream of ore constantly flowing from this camp. All together this is a showing of which Rossland may well feel proud.—*B. C. Mining Critic.*

LOWER CALIFORNIA.

The Trinidad Mining Company, owning the Trinidad group in the Jacalitos district, which includes the Piedad mine, contemplates the extensive development of its property and will probably commence work within a fortnight. All these evidences of renewed activity, taken in connection with the two new prospecting mills for the Socorro district to the south, and a marked revival of the industry at Calmalli, give Peninsula mining a more promising outlook than it has enjoyed for a couple of years past.

MEXICO.

Zacatecas.

The San Cristobal Gold Mining Company, a New York concern, has recently put in a large thirty-stamp mill, and it is reported that the Richmond and Zacatecas Gold Mining Company will soon put in at their Australia mine and Anexas a large and modern milling plant. The mine is situated within 2,000 yards of the town of Zacatecas, and it has a large and well-defined vein of fairly good ore. Owing to one cause or another, however, the mine has never been handled to advantage, but the shareholders are now beginning to hope for better things.

Chihuahua.

The Reina mine near Cusihuiriachic, is producing a large amount of rich ore. It has 4000 miners at work. In the last year it has produced $500,000 silver, has also an equal amount in ore on the dump and over a million more in sight. The Santa Elena, in the same district, ships from 40 to 75 cars of ore daily to the Aguascalientes smelters. Many new mines are being denounced in that part of the state and some of them promise to be very rich.—*Chihuahua Enterprise.*

PERSONAL NEWS ITEMS

P. LAWRENCE of Butte, Montana, is in Los Angeles for his health, having recovered from the third attack of pneumonia.

JOHN BECK of the Bullion-Beck, devoted several days to a visit in Colorado last week.

R. S. SPENCE, chief owner of Humming Bird, Paris, Idaho, is in Salt Lake City, Utah.

A. C. LIPPENCOTT, of Boise, Idaho, was in Salt Lake City last week for several days.

M. W. GIBBONS, of the Kasser G. M. Co., has returned to Globe, Arizona, from California.

T. R. JONES has returned to Utah from a visit among the smelter men of the east.

CHAS. H. KARLSRUHR, president, and A. VOS, secretary-treasurer Phoenix G. M. Co., Nevada City, California, have returned to their homes in the east.

W. H. ALLBRIGHT of Boston, has been visiting Utah, where he has several mining interests.

P. KERWIN of the Comstock at Virginia, Nevada, is at Grass Valley, Cal., examining the Allison Ranch mine.

S. B. MILNER has been elected manager of the Dexter Mining Co., at Tuscarora, Nevada.

GEO. CROCKER, of the Southern Pacific Co., is putting $100,000 into the development of the Alice mine Idaho Springs, Colo.

A. THIES of the Haile Mine in South Carolina, visited New York last week on his way home from a short vacation trip.

R. NICHOLS, formerly superintendent of the Sutro tunnel and now a mine manager at Coolgarde, West-Australia, is in Virginia City, Nev.

MESSRS. B. H. PAYNE, C. C. MCCARTHY, WILLIAM BRILL, F. A. DAGGE and COL. CHAS. E. WARE recently inspected some mineral land near Joplin, Mo., which they propose to develop.

O. S. BUCKBEE, who went to Fort Mohave, Ariz., a few weeks ago to become superintendent of Sheep Trail mine, is at home in San Francisco, Cal., in ill health.

W. E. RICHARDSON, mining engineer, with La Dura Mining & Milling Co., is in San Francisco, Cal. The company's mines are in Sonora, Mexico, about 100 miles from Ortiz, on the Sonora railroad.

J. C. BOYD of the Guston M. Co., at Guston, Col., is on his way to Tasmania vis San Francisco, whither he goes on mining business for his company.

CHAS. H. MERRILL, who has been engaged for two years past in mining explorations in Michoacan, Mexico, was in New York last week. He purposes spending a month in the east, after which he will go to South America on professional business.

W. H. HARDINGE, the mining engineer of Denver, Colo., is again in our midst. MR. HARDINGE has made several visits to Southern California in the last few years.

THOE. F. VAN WAGENEN, M. E., has kindly consented to allow us the use o his article published in the *School of Mines Quarterly* on the System of the Location of Mining Districts. MR. VAN WAGENEN is a thorough metallurgist and is also an authority on hydraulic mining, being the author of *The Manuel of Hydraulic Mining* for the practical miner. His article on the Location of Mining Districts is not a new theory by any means, having received the consideration of such eminent professional men as DR. R. W. RAYMOND, CLARENCE KING, J. F. KEMP and others. The article above referred to will be published in our issue of September 1st, and those interested in the geology of the country will do well to secure a copy of the JOURNAL and read it!

THE MARKETS.

NEW YORK, Aug. 6, 1898

The following are the Silver, Copper and Lead quotations for the last two weeks:

		SILVER.	COPPER.	LEAD
July	23	59¾	11 50	3 92½
"	25	59¾	11 50	3 92½
"	26	59	11 50	3 92½
"	27	58¾	11 50	3 92½
"	28	58¾	11 50	3 95
"	29	58⅝	11 50	3 95
"	30	58½	11 50	3 92½
August	1	58½	11 45	3 92½
"	2	58½	11 45	3 92½
"	3	58¾	11 45	3 95
"	4	59	11 45	3 95
"	5	58¾	11 45	3 95
"	6	58¾	11 45	3 95

Spain, it is understood, is not now on the market for silver, and the price has declined to about the Indian basis. At the close the market is reported as a limited one.

The United States Assay Office in New York reports the total receipts of silver at 174,000 oz. for the two weeks ending Aug. 6th.

COPPER.

The market is steady at the decline, but very little is doing. Buyers have been trying to obtain further concessions which producers emphatically decline to grant.

For electrolytic copper we have to reduce to 11.37½@11.50c. for cakes, wire bars or ingots, and 11.15@11.25c. for cathodes. Casting copper is nominal at 11½c.

LEAD

The opening was rather firm, but subsequently more lead came out both from first and second hands, which had somewhat depressing influence on prices and the market eased off to 3.85c. St. Louis, and 3.95c. New York.

SPELTER

Producers have been free sellers, probably in consequence of ore prices having been more reasonable during the week. Fortunately, there was a fair consumptive demand and prices are in consequence steady at 4.35@4.37½c., New York.

ANTIMONY.

Antimony continues strong, and we quote Cookson's 9¾c.; Hallett's, U. S. Star and Japanese, 9⅛.

NICKEL.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33½c. and 36c per lb and for smaller orders 35½c. and 38c.

TIN

Early in the week prices had eased off somewhat, but at the close no new concessions are obtainable from importers, and we quote 15⅝@15¾c. for July-August shipment and 15¾@15⅞c. for later deliveries.

PLATINUM.

Prices are now quoted at $15 and $16 per oz., New York. The London quotations are 58 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal, Messrs. Eimer & Amend of New York furnish the following quotations: In lots of 250 grams or more, 56c, per gram; in lots of 100 grams or more. 57c. per gram; less than 100 grams, 58c. per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

POTASSIUM CYANIDE.

Purified, 98@99 per cent., in cases of 12 lb. at 32c. per lb, in 5, 10, 25 and 50 lb tins at an advance.

QUICKSILVER.

The New York price has been again reduced 50c., and is now $42 per flask, or $1 lower than three weeks ago. The London quotation is unchanged at £7 12s. 6d., with the same price named from second hands.

POWDER.

F. o. b., San Francisco: No. 1, 70 per cent. nitro-glycerine per lb, in carload lots, 15¼c: less than one ton, 17¼c. No. 1* 60 per cent., carload lots, 13½c; less than one ton, 15½c. No. 1** 50 percent. carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40 per cent., carload lots, 10c; less than one ton, 12c. No. 2*, 35 per cent., carload lots, 9½c; less than one ton, 11½c. No. 2** 30 percent., carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car, 728 kegs, $1.50 per keg; less car lots, $2 per keg.

COKE.

The coke market has been quite dull the past week, and entirely without features of interest.

IN CAR LOTS, ST. LOUIS.

Connellsville fdy coke 72-hr. fry	$4.85
New River	$4.00
Pocahontas	3.90
Crushed	4.85
Gas works coke, lump, per bushel	10

BORAX.

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots	7¼
Concentrated, in car lots	6¼

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 98 per cent. ingots, per lb	33@40c
No. 2, 90 " " " "	31@34c
Rolled sheets, per lb	38c. up
Aluminum.—Nickel, per lb	33@39c
Bismuth, per lb	$1.30@$1.80
Phosphorus, per lb	40@50c
Tungsten, per lb	70c
Ferro-tungsten, 60 per cent	60c

Variations in price depend chiefly on the size of the order.

CHEMICALS

There has been no material change in demand for heavy goods.

Quotations generally are as follows:

CAUSTIC SODA.

Quotations for Caustic soda domestic high test are $1.40 @ 1.50 per hundred lbs.

ALKALI.

Domestic, 58 per cent., 50c. @ 55c., foreign 55c. @ 60c. from dock as to style of package.

CARBONATED SODA ASH.

58 per cent., 90c and 95c. per 100 lbs. basis 48 per cent.

BI-CARBONATE OF SODA.

English, $2.12½ @$2.25 per 100 lb. American, bulk $1.25 and $1.50 per 100 lbs. according to brand.

SAL-SODA.

For domestic, 50c. per 100 lb., less usual discounts; English, 62½c, and 65c Concentrated sal-soda, $1.60 @ $1.65 per 100 lbs.

CHLORATE OF POTASH.

Chlorate of potash is quoted at $9.25 and $9.50 per 100 lbs.

CHLORIDE OF LIME.

English prime brands $1.55@$1.60; Ordinary, $1.70@$1.80; Continental, $1.40@$1.50 per 100 lbs.

Acids.

The market for the following acids lacks interest; has practically been at a standstill, through prices are pretty steady.

Quotations are per 100 lb from New York and vicinity as follows: Acetic acid, commercial, No. 8, $1.40@$1.50; muriatic acid, 18°, $1.10@$1.75; 20°, $1.20@$1.87½; 22°, $1.35@$2.25; according to quantity and brand. Nitric acid 36°, $3.50@$4.75; 38°, $3.75@$4.62½; 40°, $4@$4.87½; 42°, $4.62½@$5.25. Oxalic axid, $6.50@$6.75. Mixed acid, according to mixture. Sulphuric acid, 66°, $1.10 for drums and $1.15@$1.75 for carboys. Chamber acid 50°, in jobbing way, $11.50@$12 per ton f. o. b. factory. Blue vitriol $3.50@$3.62½ for extra grades and $3.37½ for ordinary.

BRIMSTONE.

We have again to record a quiet market, with prices about 50c. a ton lower than last week. Best unmixed seconds can be had for $21@$21.50 a ton while thirds are sold at $19@$19.50.

MURIATE OF POTASH.

We quote per 100 lbs. on basis of 80 per cent., as follows: New York and Boston, $1.78 for 80@85 per cent., and $1.81c. for 95 per cent.; Norfolk and Philadelphia, $1.76½ for 80@85 per ct., and $1.79½ for 95 per cent.; Charleston, Savannah, Wilmington, N. C, and New Orleans, $1.78½ for 80@85 per cent., and$1.81½ for 95 per cent. All for lots of 50 tons and upward.

KAINIT.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12.4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, $8.55 @$8.80 for New York and Boston; $8.90 @$9.15 for Norfolk, and Philadelphia; and $9.05@$9.30 for Charleston. Savannah, Wilmington, N. C., and New Orleans.

NITRATE OF SODA.

Spot nitrate is in ample supply and buyers have the upper hand for the present. We have again to quote a little lower price, $1.50@$1.55 per 100 lbs. for spot. The same figures are quoted for futures, in view of the quantities known to be afloat for New York.

FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, July 28th, shows balances in excess of outstanding certificates as below, comparision being made with the statement for the corresponding date last week:

	July 28	Changes.
Gold	$129,471,535	I. $2,266,392
Silver	13,747,199	I. 715,046
Legal Tenders	46,063,752	I. 1,618,490
Treas'y Notes, etc	4,095,106	I. 464,005
Totals	$253,380,602	I. $5,063,833

Treasury deposits with national banks amounted to $57,627,771, an increase of $97,771 during this week.

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month	1898 Cents.	1897 Cents.	1896 Cents.
January	56 77	64.79	67.13
February	56.07	64.67	67.67
March	54. 90	63.06	68.40
April	56.02	61.85	67 92
May	56.98	60.42	67.78
June	58.61	60.10	68.69
July	59 06	59.61	68.75
August	—	54.19	67.34
September	—	55.24	65.68
October	—	57.57	66 05
November	—	57.91	64.93
December	—	58.01	65.24
Year		59.79	67.75

Gold and Silver Exports and Imports.

At all United States ports, June, 1898, and years from January 1st, 1898 and 1897:

	Coin and Bullion Exp.	Imp.	In Ores Exp.	Imp.
Gold—				
June	$ 375,529	$ 3 184,774	$.....	$145,838
1898	6,048,560	90,244,751	72,441	2,639,042
1897	25,000,717	3,715,240	93,188	2,220,314
Silver—				
June	4,156,650	799,755	.....	1,229,048
1898	24,392,928	3,202,116	112,699	9,276,271
1897	27,894,900	4,419,889	259,150	10,600,481

This statement includes the exports and impaorts at all United States ports, the figurres being furnished by the Bureau of Statistics of the Treasury Department.

Shipments of silver from London to the East for the year up to July 14th are reported by Messrs. Pixley & Abell's circular as below:

	1897	1898	Changes.
India	£2,847,700	£2,987,440	I. £139,740
China	100,942	354,140	I. 253,198
The Straits	106,405	150,762	I. 44,357
Totals	£3,055,047	£3,492,342	I. £437,295

The statement of the Bureau of Statistics for June puts the exports for that month at $94,808,263, which is still a very high figure, while imports were $51,267,591. For the fiscal year ending June 30th the statement is as follows:

	1897.	1898.
Exports	$1,050,933,556	$1,231,311,868
Imports	764,730,412	616,052,844
Excess, exports	$286,263,144	$ 615,259,024
Add excess of exports, silver		31,413,411
Total		$646,672,435
Deduct excess of imports, gold		104,985,283
Net apparent balance		$ 542,687,152

POSITIONS WANTED

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers.

Other than above $1.00 per month will be charged.

Advertisements not accepted for less than one month.

WANTED, by a young experienced man, position as quartz mill man, one who can keep mill running.
Address, A. E. CHARLESWORTH,
LOCKFORD, CAL.

WANTED, by a young man, a position as Assayer, etc; experienced, competent and has a good knowledge of all metallurgical operations. Good references.
Address, T. K. JOURNAL OFFICE,
Stimson Block, Los Angeles, Cal.

WANTED—Situation by Millman and Assayer; Wages reasonable; Good references.
Address "H"
JOURNAL OFFICE

EXPERIENCED Aassayer and Cyanide operator desires engagement. The successful and economical treatment of slimy ore or tailings by cyanide a specialty.
ADDRESS W. V. WATSON,
Ely, White Pine Co., Nev.

AN EDUCATED Chemist and Millman, thoroughly understands Milling, Chlorination and Cyanide Processes. Twelve years experience in Montana and Colorado, now open to an engagement. Moderate salary. Address:
"Chemist" JOURNAL OFFICE,
Los Angeles, Cal.

FOR SALE!

I HAVE some good gold mining properties for sale at reasonable prices, some developed and some real good properties at Ward, Eldora, Gold Hill, Jamestown, Magnetia, Caribon and Sugar Loaf. Write stating what you want or call on me. JAMES M. NORTH,
Former County Judge,
BOULDER, COLO

MINING STOCK QUOTATIONS

BOSTON

Aetna Con	—	do. rights	55
Allouez	3 38	Gold Coin	1 00
Anaconda	—	Humboldt	4 75
Arnold	16 88	Illinois Steel	60 00
Ash Bed	3 88	Lake Sup Iron	—
Atlantic	28 00	Merced	—
Baltic	17 88	National	75
Bonanza	—	New Idria Mg	—
Boston and C C	—	Old Dominion	28 00
Boston & Mont'a	211½	Osceola	55 25
Butte & Boston	24 75	Parrott	22 00
Calumet & Hecla	575 00	Pioneer	5 75
Catalpa	—	Quincy	118¼
Centennial	16 50	San Ysabel	—
Dominion Coal	24 00	Tamarack	165 00
Dominion Pref	169 ¾	Tecumseh	2 00
Franklin	14 75	Wolverine	23 00

NEW YORK.

Alamo	03¾	Homestake	28 50
Alice	40	Iron Silver	—
Annetta	45	Mexican	30
Best & Belcher	60	Mollie Gibson	19
Brunswick	05	Ontario	4 50
Bulwer	—	Ophir	—
Crown Point	65	Pharmacist	10
Con. Cal & Va	—	Plymouth	—
Cripple Creek Con	08½	Quicksilver	3 00
Deadwood	—	Quicksilver pfd	11 00
Favorite	11 25	Sierra Nevada	—
Fortuna	04	Standard	1 60
Golden Fleece	45	Union Con	—
Gould & Curry	45	Yellow Jacket	—
Hale & Norcro s.	—		

SAN FRANCISCO.

Alpha	—	Exchequer	—
Alta Con	10	Gould & Curry	21
Andes	09	Hale & Norcross	1 65
Belcher	23	Justice	55
Best & Belcher	27	Mexican	21
Bodie	—	Ophir	80
Bullion	10	Overman	—
Challenge	26	Potosi	21
Chollar	15	Savage	10
Confidence	85	Sierra Nevada	67
Con. Cal. & Va	49	Union Con	11
Con New York	—	Utah	07
Crown Point	13	Yellow Jacket	30

COLORADO SPRINGS STOCKS

Alamo	02	Jack Pot	03½
Anaconda	52½	Lexington	—
Argentum Juanita	26	Lillie	90
Bob Lee	—	Magnet R	008½
Creede & C C	08¾	Marion	—
C C Consolidated	09	Matoa	15
Des Moines	—	Mollie Gibson	24½
Elkton Con	93	Moon-A'c'r	74¼
El Paso	07	Mount Rosa	12⅝
Fanny R	16	New Haven	01½
Favorite	—	Pharmacist	05
Findley	03½	Pilgrim C	—
Franklin	—	Portland	99¼
Golden Crater	—	Pr. Albert	01¾
Golden Fleece	30	Specimen	—
Gold & Globe	—	Theresa	—
Hayden	005	Trachyte	00¾
Ing. Con.	06¾	Union Gold	01½
Isabella	23⅝	Work	02¼

SALT LAKE CITY

Alice	70	Lucky Bill	—
Ajax	30	Malvern	—
Alliance	—	Mammoth	1 87½
Anchor	20	Maxfield	—
Buckeye	02	Mercur	7 25
Bull, Beck	5 50	Morgan	—
Cent. Eureka	32 00	Northern Light	10
Chloride Point	96½	Omaha	27½
Dalton	00¾	Ontario	3 60
Daly	70	Overland	—
Daly West	3 50	Richmond Ana-conda	03½
Dalton & Lark	06	Rover	—
Dexter	1 02	Sacramento	45
Eagle	04	Silver King	18 50
Eureka Hill	—	Sioux Con	—
Four Aces	04	Sunbeam	06
Galena	42	Sunshine	26½
Gemini	—	Swansea	2 42½
Geyser-Marion	77	So. Swansea	1 18½
Grand Central	6 90	Utah	60
Homestake	00¼	Utah Con	—
Horn Silver	1 37½	Young America	57½
Little Pittsburg	01½		

ROSSLAND, BRITISH COLUMBIA.

Alberta	05	Josie Mac	12½
B. C. Gold King	07	Josie	38
Beaver	10	Jumbo	75
Big Three	10	Knight Templar	05
Bluebird	07	Kootenay-London	10
Bruce	10	Le Roi	8 00
California	15	Lilly May	18
Caledonia Con	05½	Mabel	15
California	15	Mayflower	10
Camp Bird	05	Monita	16
Celtic Queen	05	Monte Christo	19½
Centre Star	—	Morning Star	08
Colonna	24	Mugwump	03
Commander	18	Nest Egg	05
Deer Park	12½	Northern Belle	10
Della Colla	02	Novelty	09
Delaware	12	O. K	10
Eastern Star	20	Palo Alto	05
Enterprise	20	Phœnix	13½
Eric	03½	Poorman	10
Eureka Con	05½	R. E. Lee	15
Evening Star	08½	Red Eagle	06
Georgia	10½	Red Mount. View	—
Gertrude	10½	Red Point	10
Golden Drip	15	Rossl'd H'mest'ke	05
Good Hope	03½	Rossland, Red Mt.	20
Grand Price	03½	St. Elmo	06
Great Western	08	St. Paul	12½
Hattie Brown	—	Silver Bell	04
Helen	04	Silverine	06
High Ore	04½	So. Cross & W. Con	20
Imperial	10	Virginia	12
Iron Horse	20	War Eagle Con	1 00
Iron Mask	38	West Le Roi	21
I. X. L	10	White Bear	11

DENVER STOCK REPORT.

Aetna	001½	Keystone	04
Anaconda	51	Lillie	90
Arcadia	00¾	Moon A	76
Argentum Junita	26	Mt. Rosa	12¼
Banner	07	Old Gold	003
Bob Lee	002½	Peoples	01¼
C C Con	08¾	Pilgrim C	002¾
Elkton	90½	Pine Creek	002½
El Paso G	06½	Portland	—
Enterprise	02½	Prince Albert	01¾
Garfield Grouse	06	Republic	02½
Geo. Washington	003¼	Sacramento	02½
Golden Eagle	34	Specimen	03
Gold Coin	98	Tamarrack	004½
Gilpin & C C	08¾	Union Gold	10¼
Gilpin Four	004½	Virginia M	03¾
Iron Clad	02¾	Wheel of Fortune	002¾
Isabella	23⅝	Work	02⅞
Jack Pot	03¾		

MEXICO

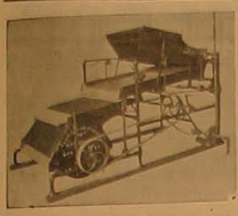
Name of Company	State	Price
Alianza	Hidalgo	5
Amistad y Concordia	"	24
Angustias	Guanajuato	390
Arevalo y Anexas	Hidalgo	240
Asturiana y Anexas	Zacatecas	170
Barradon y Cabras	Durango	150
Bartolome de Medina	Hidalgo	100
Cabezon y An	Zacatecas	30
Candelaria de Pinos	"	160
Capuzaya	Durango	120
Carmen	Hidalgo	400
Castellana y San Ram	Tepic	25
Cerro Colorado	Chihuahua	10
Cinco Senores y An	Guanajuato	480
Concepcion y Anexas	S. Luis Potosi	100
El Oro	Guanajuato	40
Esparanza y An	Mexico	1,300
Guadalupe	Guanajuato	180
Huautla	Santa Ana	100
Luz de Borda	Michoacan	40
Luz de Maravillas	Hidalgo	100
Pabellon	"	150
Palma	Zacatecas	100
Purisima de los Com	"	5
Real del Monte	Hidalgo	900
Refugio y Va	"	8
Restauradora	Durango	60
San Francisco	Hidalgo	270
S. Ped. Chalchihuites	"	12
San Rafael y Anexas	"	925
do. Free Stock	"	400
San Rafael del Oro	Hidalgo	20
Sto. Maria de la Paz	S. Luis Potosi	650
Sirena	Durango	50
Soledad	Hidalgo	500
Sorpresa	"	250
Trinidad	Guanajuato	40
Tlauzingo	Puebla	27
Union	Hidalgo	260
Zomelahuacan (gold)	Vera Cruz	100
Zona Min. de Pozos	Guanajuato	15

NOTE—The above Mexican stocks are figured on the basis of Mexican silver

INCORPORATED MINES PAYING DIVIDENDS.

	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
1	Aetna Cons	California	100,000	$ 500,000	$ 5	$ 10	July 1898	$ 140 000	Q.
2	Ajax	Utah	300,000	3,000,000	10	.....	.....	1,000 000	G, C, S, L.
3	Alaska, Treadwell	Alaska	200,000	5,000,000	25	35½	October, 1897	3,250,000	G.
4	Alaska Mexican	Alaska	200,000	1,000,000	5	10	Oct., 1897	297,031	G.
5	Alice	Montana	400,000	10,000,000	25	05	April 1898	1,075,000	G
6	Alice	Utah	400,000	10,000,000	25	05	April 1898	1.075,000	S, L, G.
7	Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1898	6.750,000	C.
8	Anchoria Leland	Colorado	600 000	600,000	1	01	July 1898	144 000	G.
9	American Gold	Colorado	300 000	3,000 000	10	02	Mar 1898	291,000	G. S. L
10	Atlantic	Michigan	40,000	1 000 000	25	1 00	Feb. 1897	740 000	S.
11	Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	512,500	G, C. S.
12	Bangkok C-Bell	Colorado	600,000	600,000	1	01	July 1896	107,510	S. L. C.
13	Big Six	Colorado	500,000	500,000	1	00½	May 1898	15,000	G. S.
14	Boston & Montana	Montana	150,000	3,750,000	25	3 00	May 1898	7.625,000	G, C, S.
15	Bullion Beck and Champion	Utah	100,000	1,000,000	10	50	Mar 1897	2,485 000	G, S.
16	Bunker Hill and S	Idaho	300,000	3,000,000	10	05	Oct 1897	324,000	S. L.
17	Cariboo	British Col	800,000	800,000	1	02	May 1897	156 965	G.
18	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct 1897	50,850 000	C.
19	Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
20	Central Lead	Missouri	4,000	400,000	100	1 00	Oct 1897	16,000	L.
21	Charleston	South Car	10,000	1,000,000	100	1 00	Feb 1897	150,000	.....
22	Champion	California	34,000	340,000	10	25	April 1898	296,200	G.
23	Chloride Point	Utah	500,000	500,000	1	01	Dec. 1897	5,000	G, S
24	Colorado Sun	Montana	100,000	1,000 000	10	50	June 1898	1,595,000	G, S, C.
25	Crescent	Utah	24,000	600,000	25	.....	July 1897	280,000	.....
26	Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S, L.
27	Deadwood Terra	Dakota	200,000	5,000,000	25	40	June 1897	1,320,000	G.
28	De Lamar	Idaho	400,000	2,000,000	5	25	Jan 1897	2,250,100	S, L.
29	Della S	Colorado	1,000,000	1,000,000	1	10	Jan 1897	60,000	G.
30	Doe Run	Missouri	5,000	500,000	100	50	October 1897	.....	L.
31	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01½	July 1898	555,710	G, S.
32	El Paso	Colorado	650,000	650,000	1	01	Jan 1893	12,093	G. S.
33	Eureka Hill	Utah	10,000	1,000,0 0	100	.....	 1897	1,850,000	.....
34	Florence	Montana	500,000	2,500,000	5	01	May 1897	132,530	S.
35	Gemini	Utah	5,000	500,000	100	.....	1897	500,000	.....
36	Geyser-Marion	Utah	300,000	1,500,000	5	02	May 1898	84,000	G.
37	Gold Coin of Victor	Colorado	1,000,000	1 000,000	1	01	June 1898	80 000	G.
38	Golden Cycle	Colorado	20 ,000	1 000 000	5	00½	June 1898	150,000	.....
39	Gold Coin	Colorado	200,000	1 000,000	5	05	Nov 1897	160,000	G,S.
40	Gold and Globe	Colorado	750,000	750,000	1	3–10	July 1897	51,625	G.
41	Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S, G, L, C.
42	Helena & Frisco	Idaho	500,000	2 500 000	5	04	August 1896	475,000	S, L.
43	Highland	S. Dakota	100,000	10,000,000	100	20	Oct 1897	3,424,918	G.
44	Holy Terror	S. Dakota	300,000	300,000	1	03	Sept 1897	18,000	G.
45	Homestake	S Dakota	125,000	12,500,000	100	25	Oct 1897	6,431,250	G.
46	Hope	Montana	100,000	1.000,000	10	10	Mar 1893	762,252	S.
47	Horn Silver	Utah	400,000	10,000,000	25	05	April 1898	5,120,000	S, L.
48	Idaho	Brit. Col	500,000	500,000	1	05	Mar 1887	152,000	.....
49	Iowa	Colorado	1,000,000	1,000,000	1	00½	June 1898	90,000	G.
50	IronMountain	Montana	500,000	5 000,000	10	1 00	Jan 1898	501.100	S.
51	Isabella	Colorado	2,250,000	2,250,000	1	00½	June 1897	270,000	G.
52	Kearsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
53	Last Chance	Brit. Col	500,000	500,000	1	04	Jan 1897	42,000	S. L.
54	Le Roi	British Col	500,000	2,500,000	5	10	Oct 1897	625,000	G.
55	Lillie	Colorado	1,000,000	1,000,000	1	01	July 1898	99 100	G.
56	Minnesota	Minnesota	165,000	16,500,000	100	1 50	July 1896	3,240 000	I.
57	Montana Ltd	Montana	660,000	3,300,000	5	05⅓	May 1898	2,997,557	G, S.
58	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	July 1898	760,000	.....
59	Morning Star	California	2,400	240,000	100	5 00	June 1898	666,600	G.
60	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898	60,000	G.
61	Mercur	Utah	200,000	5,000,000	25	18	May 1898	1,066,000	G.
62	Mammoth	Utah	400,000	10,000,000	25	05	June 1898	1,250,000	G, S, C, L.
63	Moon Anchor Gold	Colorado	600,000	600 000	1	07½	July 1898	216 000	G.
64	New Elkhorn	Colorado	300 000	1 500,000	5	24	Sep. 1896	72,000	G
65	New York & Hon. Rosario	Central A	150,000	1,500 000	10	10	Oct. 1897	832,500	S, G.
66	Napa	California	100 000	700,000	7	20	July 1898	930,000	Q.
67	New Idria Quicksilver	California	100,000	500 000	5	10	July 1898	60 000	Q.
68	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S, L
69	Osceola	Michigan	50,000	1,250,000	25	1 00	June 1897	2,172,500	C.
70	Parrot	Montana	230,000	2,300,000	10	30	July 1898	2,000,898	C.
71	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	June 1898	38,775	.....
72	Portland	Colorado	3,000,000	3,000,000	1	01½	June 1898	1,492,898	G, S.
73	Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	45.000	G.
74	Quincy	Idaho	100 000	2,500,000	25	4 00	August 1897	9,470 000	C.
75	Rambler-Cariboo	Brit. Col	1,000,000	1,000,000	1	02	April 1897	40,000	.....
76	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898	20 000	G.
77	Reco	Brit. Col	1,000,000	1,000,000	1	50½	May 1897	187 500	S, L
78	Sacramento	Utah	1,000,000	5,000,000	5	00½	June 1898	35,000	G.
79	Santa Rosalia	California	100,000	100,000	1	10	Feb. 1898	125,000	G, S
80	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S.
81	South Swansea	Utah	150.000	150,000	1	05	April 1898	90,000	S, L.
82	Standard	California	200 000	20,000,000	100	10	Mar 1898	5,654,940	G, S
83	St. Joseph	Missouri	250,000	2,500 000	10	15	Oct 1897	24,000	L.
84	Silver King	Utah	150 000	3,000,000	.20	25	June 1898	1,575,000	S, L, G.
85	Slocan Star	Brit. Col	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	.....
86	Snuggler	Colorado	1,000,000	1.000 000	1	01	June 1898	1,035,000	S, L Z.
87	Smuggler Union	Colorado	50,000	5,000,000	100	1.00	Oct 1896	150,000	G S
88	Swansea	Utah	100,000	500,000	5	05	June 1898	100,000	S L
89	Tom Boy	Colorado	200 000	2,000,000	10	10	Dec 1896	600,000	G.
90	Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1897	4,950,000	C.
91	Union	Colorado	1,250,000	1,250,000	1	01	June 1896	73,000	S.
92	Utah	Utah	100,000	1,000,000	20	01	Dec. 1897	177,000	G, S.
93	Utah Consolidated	Utah	30 000	150,000	5	02	Sept. 1896	3,0 0	S. L.
94	Victor	Colorado	200,000	1,000,000	5	50	June 1898	955,000	G.
95	Vindicator	Colorado	1,500,000	1,500,000	1	05	July 1898	76,125	G.
96	Western Mine Enterprise	Montana	500,000	500,000	1	20	Jan 1898	48,680	.....
97	War Eagle	British Col	500,000	500 000	1	06	October 1896	187 000	.....

S, Silver. G, Gold. L, Lead. C, Copper. Q, Quicksilver. I, Iron. Z, Zinc.



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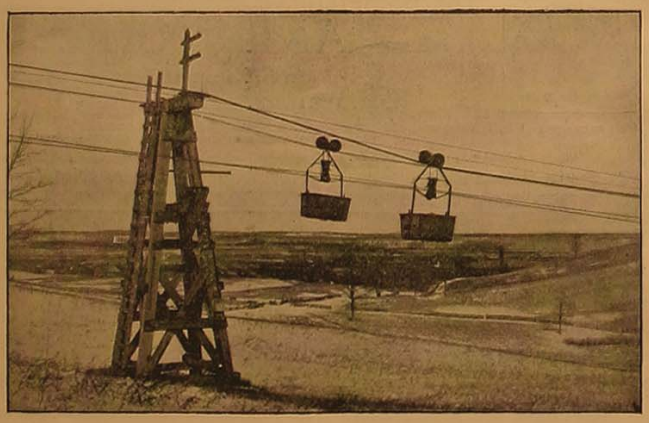

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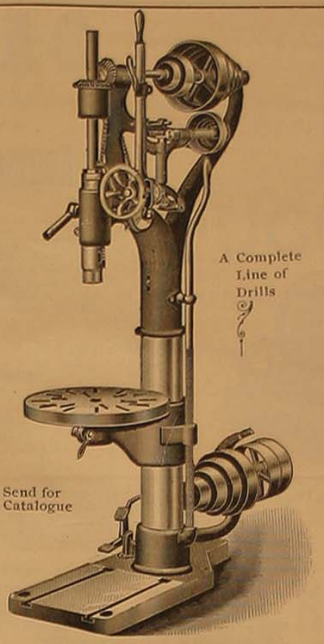

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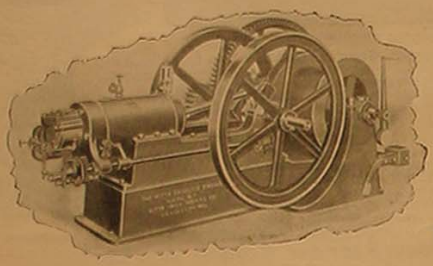

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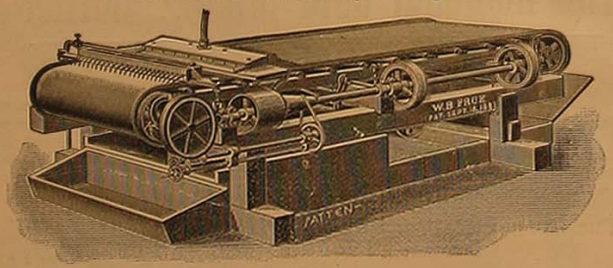
FOUR and SIX FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts



After a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the world." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "Standard" which all competitors are trying to imitate.

The results obtained by this machine are the "Acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it, and the manufacturers will tell you that they are "just as good, and cheaper, etc." The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the years results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e. Clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska Treadwell Mine where they have ordered over 350 Frue Vanners one man attends 48 machines for 12 hour shift.

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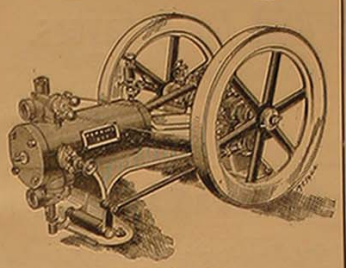

MODEL OF 1897

Composed of Sixteen parts, constructed so plain and substantial that it may be taken to the desert mines without fear of unreliable operations, uses Storage and Dynamo for sparking, the cooling jacket water is used over. Uses about 8-10 of a gallon of gasoline for each horse power for a twelve-hour run. Ten horse power engine weighs 2250 lbs. boxed for shipment.

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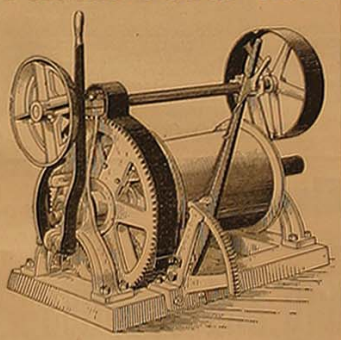

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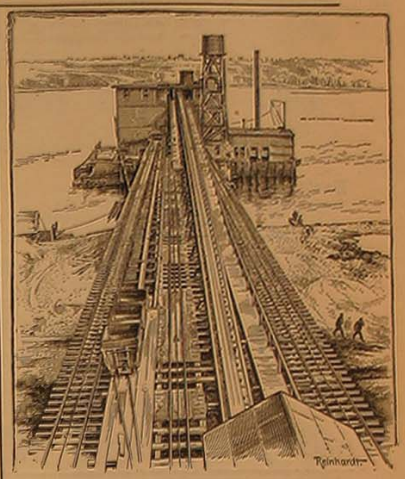

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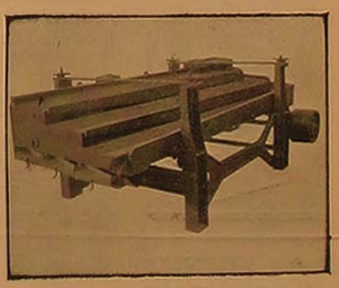

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